APRIL, 1940

ELECTRICAL SOUTH

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THE Robert E. Lee, Jackson, Mississippi, is one of the South's finest hotels.

Every sleeping room is equipped with a HUNTER ADAPTAIR fifty-two inch ceiling fan. This enables the guest to regulate the breezes either upward or downward as desired.

And now HUNTER engineers are installing ZEPHAIR cooling units in the hallways throughout this building which will complete the air circulation and provide natural ventilation.

HUNTER FAN & VENTILATING CO., INC.

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NEW ORLEANS
PHILADELPHIA
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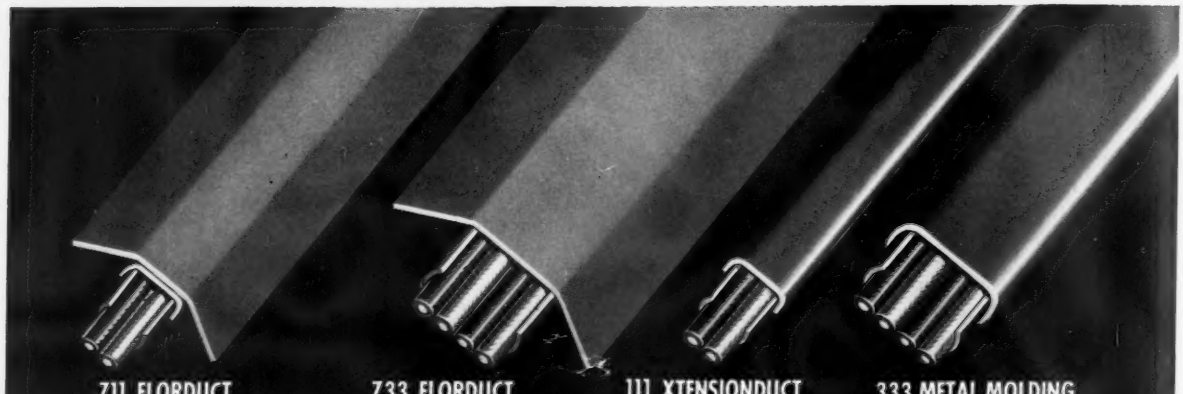
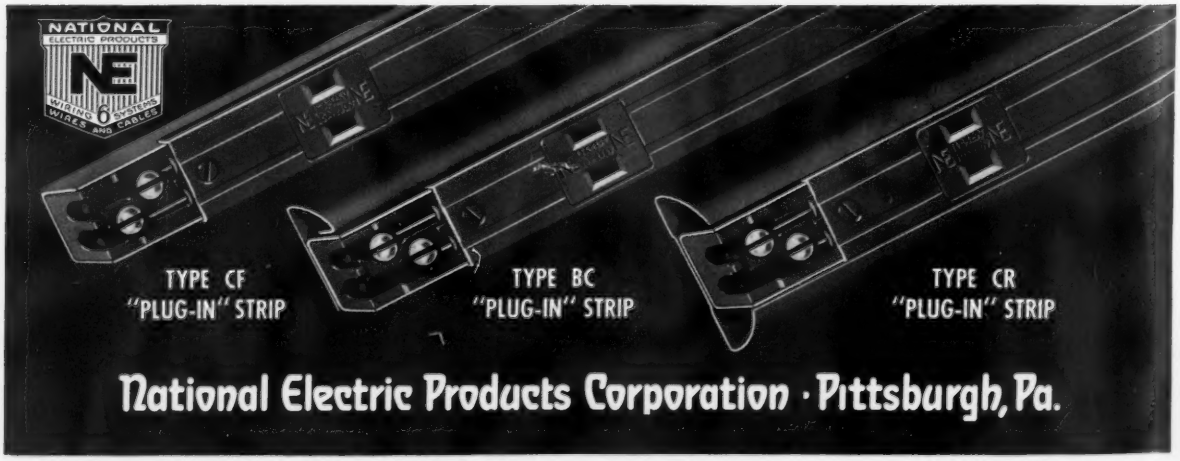


AND FITTINGS FOR EVERY REQUIREMENT



National Electric Products Corporation · Pittsburgh, Pa.

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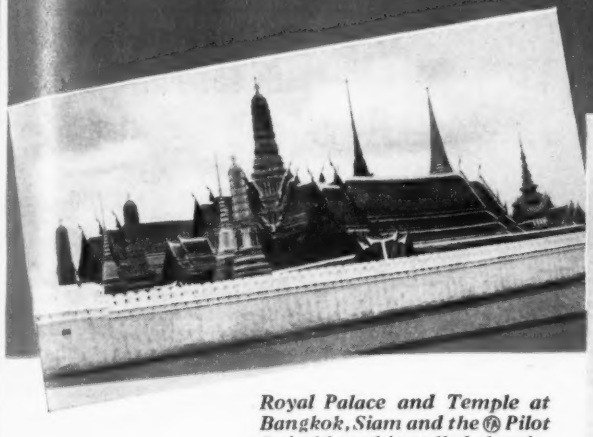
Volume 20 **Number 4**

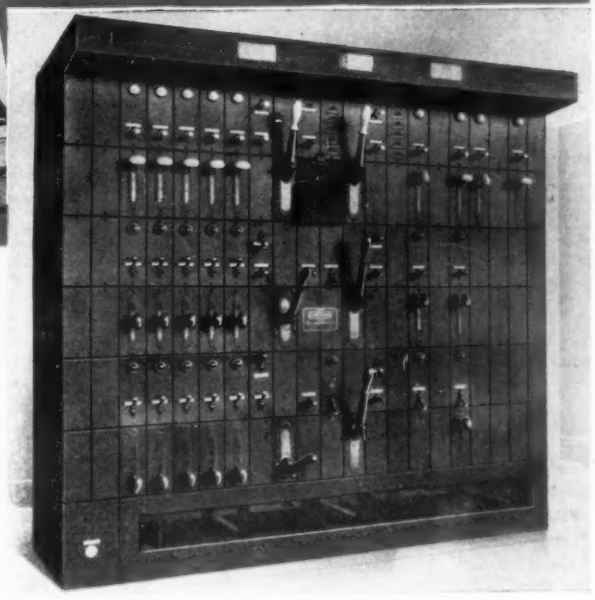
THE KING OF SIAM

equipped the private motion-picture theater in the royal palace with an

(FA) STAGE LIGHTING CONTROL SWITCHBOARD



Royal Palace and Temple at Bangkok, Siam and the (FA) Pilot Switchboard installed therein.



In foreign countries, as well as in almost every State in the Union, (FA) Equipment is chosen by many architects, engineers and contractors because (FA) Products are *made better than necessary* — of pleasing design as well as maximum efficiency.

Having specialized in Stage Lighting and Dimmer Control since 1904, it is but natural that (FA) Stage Lighting Control Equipment fits the particular (and often complicated) requirements of such installations, at an ultimate saving to the user because of trouble-free, lasting service.

Whether your problem concerns a small school—a recreation center—or a large auditorium—there is a suitable type of (FA) Lighting Control Switchboard for its needs.

Avail yourself of the experience of (FA) Sales-Engineers in this highly-specialized field

Located in principal cities, they will be glad to give you the benefit of their many years of training. Write for the name and address of the one nearest you . . . And ask for Catalog No. 56. . . . Frank Adam Electric Company, St. Louis, Mo.

EST. 1891 THE SIGN OF A BETTER JOB

FA

Frank Adam

STAGE SWITCHBOARDS

FRANK ADAM ELECTRIC CO. ST. LOUIS, MO. U.S.A.

EXTRA HAZARD REW

Published by the Hazard Insulated Wire Works,

NEW SMALL DIAMETER BUILDING

Large Office Building Rewired with Type SN Small Diameter Wire

EXISTING RACEWAYS USED—OWNER MADE BIG SAVING

An office building, built in 1912, consisted of brick, steel and concrete construction of four stories with basement. The building was approximately 54 feet wide by 195 feet long. Floors were of reinforced concrete 4½ inches thick with 1-inch finish and plaster applied direct to under side of slab. Interior walls and partitions were of 4-inch gypsum block and plaster. The branch circuit conduits were ½-inch size and contained No. 14 standard Code wire. A total of 937 outlets were already in the building.

It was desired to increase the illumination. The original and increased wattage of fixtures is shown in the table below.

Location	Old Units (watts)	New Units (watts)
Basement	150	200 and 300
Display Room	500	2400
Bookkeeping	200	1000
Executive Offices	300	1500
General Offices	200	750
Rest Room and Minor Offices	200	500
Stairwells	75	150

After a study of the additional copper necessary for branch circuits, the following combinations were worked out:

6 — No. 12 Conductors in ½-inch conduit
4 — No. 10 Conductors in ½-inch conduit
2 — No. 8 Conductors in ½-inch conduit

These conductors had **synthetic** coverings of 2/64-inch thickness without braid, and were used to avoid any combination which would exceed 50 per cent fill of the conduit.

In wiring for the 2400-watt fixtures on the display floor, the old circuit arrangement was changed from two outlets per circuit to two circuits per outlet. All boards were changed from 3-wire, 120-208 volts to 3-phase, 4-wire, 120-208 volts. By the use of thin-wall synthetic insulation, the watt capacity of existing conduits was increased two and three times regular Code standards.

The electrical contractor experienced no difficulty of any kind in installing the conductors. The pulls were easy even on long runs, and no lubricant was necessary. Voltage breakdown tests on the thin-wall insulated wire after pulling in place showed an average of 9500 volts. The insulation was not perceptibly marked or gouged during the installation process. Temperature tests were taken with six No. 12 synthetic covered conductors installed in ½-inch conduit encased in 2 inches of concrete with each conductor carrying 18 amperes. Maximum sustained temperature under these conditions was 61 degrees Centigrade based on an ambient of 40 degrees C. This temperature is within the limits set by the manufacturers of the particular conductor used.

About 150 additional branch circuits were provided together with 90 additional outlets. A complete change of the basement vault and transformer installation was also necessary. The original system consisted of three 100 kva, single-phase transformers, a switchboard of slate panels mounted on pipe frame work, and fused knife switches for main feeder control. In order to provide adequate service facilities for increased load, the vault was enlarged for two banks of three 150 kva, single-phase transformers, each with arrangements for a street tie equivalent to the capacity of each bank. A 1600 ampere air circuit breaker was installed for the main service.

A General Office after Modernization.

It should be particularly noted that when new materials such as thin-wall conductors are used to increase wattage capacities and branch circuits in existing conduits, the additional loads require increasing feeders, mains and service equipment as well.

All of this additional business was created for contractors, labor, wholesaler and manufacturer by the use of new ideas in wiring.

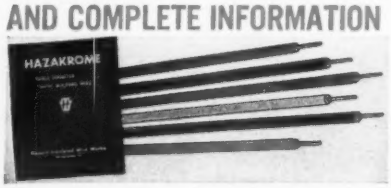
ELIMINATION OF BRAIDS AND FIBROUS COVERINGS FORWARD STEP IN WIRE DESIGN

New Wire Pulls Easily

HAZAKROME does away with braids or other fibrous coverings which take up valuable space.

The slick, smooth, waxed surface of HAZAKROME makes pulling through ducts easy. Each circuit is easily recognized by the standard colors of the insulation itself. Furthermore this new insulation is not affected by exposure to light. HAZAKROME is easy to install and . . . it lasts.

A WORKING KIT OF SAMPLES AND COMPLETE INFORMATION



A complete kit of samples of HAZAKROME wire containing the various colors and typical selections from the full range of sizes is ready for you.

In addition to the wire, the kit will contain complete data on the use of the wire as well as descriptive data which will be invaluable in figuring on rewiring jobs.

These kits and instructions are free on application. Be sure to write Hazard for yours today.

Capacity Doubled in Half-Inch Conduit by Using Small Diameter Wire

SIMILAR INCREASES FOR OTHER SIZES

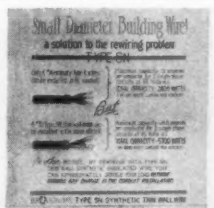
Where two single phase circuits have been installed in a ½ inch conduit, previous National Electrical Code requirements permitted only 4-#14 wires to be installed. These conductors can be replaced with 4-#10 HAZAKROME Type SN small diameter building wires. Total circuit wattage will thereby be increased from 2800 watts to 5700 watts.

In a lighting circuit this means that the lamps can be doubled in size merely by using Type SN wire instead of ordinary Type R rubber insulation. No conduit changes are necessary. Typical examples of other possibilities are listed below:

Relative Conduit Capacity

	Ordinary Type R wire	HAZAKROME Type SN wire
1" pipe —	3 #8 wires (35 amps/conductor)	3 #2 wires (96 amps/conductor)
1½" pipe —	3 #1 wires (91 amps/conductor)	3 #3/0 wires (166 amps/conductor)

HAZAKROME Type SN Displays Convince Thousands at Shows



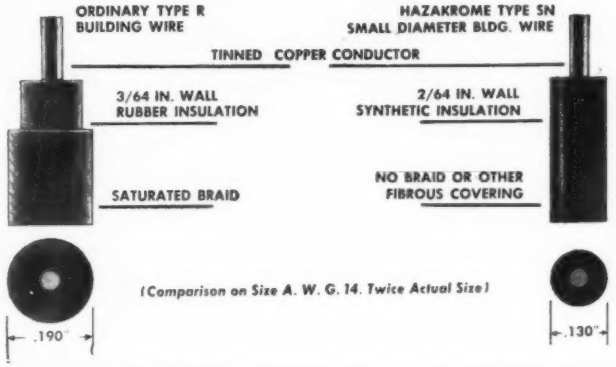
Hazard exhibits at The National Electrical Contractors Association Convention last year and at the New York and Boston Electrical Trade Shows have given thousands of contractors the information they need to go out after this new and profitable market.

With this exhibit you can demonstrate just how easy it is to increase line capacity at minimum cost. Write Hazard at Wilkes-Barre to find how such an exhibit can be obtained.

WIRING NEWS EXTRA
Division of The Okonite Company, Wilkes-Barre, Pa.

WIRE OPENS TREMENDOUS MARKET

HAZAKROME Type SN Offers Obvious Advantages


ORDINARY TYPE R BUILDING WIRE
HAZAKROME TYPE SN SMALL DIAMETER BLDG. WIRE
TINNED COPPER CONDUCTOR
3/64 IN. WALL RUBBER INSULATION
2/64 IN. WALL SYNTHETIC INSULATION
SATURATED BRAID
NO BRAID OR OTHER FIBROUS COVERING
(Comparison on Size A. W. G. 14. Twice Actual Size)
.190"
.130"

Comparative Outside Diameters

A. W. G. SIZE	Ordinary Type R Building Wire Approx. O.D. Inches	HAZAKROME Type SN Small Diameter Approx. O.D. Inches
14 sol.	.190	.130
12 "	.210	.147
10 "	.230	.168
8 "	.280	.227
6 str.	.380	.314
4 "	.450	.363
2 "	.510	.423
1 "	.570	.496
1/0 "	.630	.537
2/0 "	.670	.583
3/0 "	.730	.634
4/0 "	.780	.692

The 60° C. maximum recommended operating temperature of HAZAKROME Type SN as against 50° C. for ordinary Type R wire means greater possible current loadings (see adjacent table).

Comparative Current Loadings

A. W. G. SIZE	Ordinary Type R Building Wire — Amperes	HAZAKROME Type SN Small Diameter — Amperes
14 sol.	15	18
12 "	20	23
10 "	25	31
8 "	35	41
6 str.	45	54
4 "	60	72
2 "	80	96
1 "	91	110
1/0 "	105	127
2/0 "	120	145
3/0 "	138	166
4/0 "	160	193

The values shown above are for 1, 2, or 3 conductors in a single conduit as proposed for the 1940 National Electrical Code.

HAZAKROME ALSO AVAILABLE FOR POWER CIRCUITS

Synthetic Insulation Not Limited To Lighting Circuits.

Rewiring of important power and feeder circuits with larger conductors is made possible with HAZAKROME synthetic small diameter building wire as Type SN is available in all conductor sizes up to and including #4/0.

ADEQUATE WIRING A REALITY WITH HAZAKROME TYPE SN

4 Distinct Advantages

1 Smaller Diameters
2 Greater Current Capacity
3 Greater Permissible Conduit Fill (about 25% more than for ordinary Type R)
4 Non-inflammable Insulation

Each of these is important and money saving. Combine them all in one wire and you have compelling cause to specify and use HAZAKROME Type SN.

Type SN Synthetic Insulation Permits Greater Capacity Without Changing Conduits in Old Installations

HEAVIER COPPER OR MORE CONDUCTORS IN EXISTING RACEWAYS AT MINIMUM COST

The ever-increasing quantity of new electrical appliances, equipment such as air conditioning units, higher intensity lighting, etc., have made greater demands than existing wiring circuits are able to carry. Owners of commercial and industrial buildings, apartments and residences were faced with the great expense involved in ripping out small conduit from walls, floors and ceilings to install conduit large enough to carry the larger sized wires needed.

But, the introduction of small diameter building wire is saving owners this tremendous expense. These new wires are used in existing raceways thereby doing away with the need for tearing out existing construction.

Much work that has been held up because of the great cost of new conduit installation will now be released by owners, and electrical contractors are expecting to be kept busy for some time to come.

Interest has focused on HAZAKROME Small Diameter Synthetic Insulated Building Wire, which is made in all sizes up to and including 4/0. This slick, easy pulling, braidless Type SN Wire comes in all standard colors. Leatherlike in texture, it resists moisture, flame, oil, acids and abrasion, making it ideal in every respect for the work demanded of it. Electrical contractors are asking their jobbers (or writing to us in Wilkes-Barre) for samples and data on HAZAKROME.

APPROVAL

Last December the Electrical Committee of the N.F.P.A. reported its approval of Small Diameter Building Wire. Until the report is formally accepted by the National Fire Protective Association and included in the 1940 National Electrical Code, its use in new work and rewiring is contingent upon approval by local inspection authorities.

Reports from various parts of the country indicate that local approvals to use small diameter building wire are generally being obtained upon application.

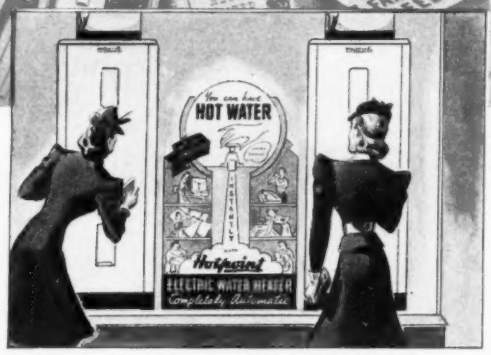
Buses lined up perfectly, with bends formed to match exactly; this is an installation of which the workmen can well be proud. It will retain its fine appearance, too, for bus and fittings are Alcoa Aluminum.

Tubular Alcoa Aluminum Bus, though light in weight, is very rigid. Supports can be widely spaced. Weight of supporting structures can be lower, with the result that material and construction costs are less. Alcoa Aluminum conductors, whether tubular, flats, angles or channels, offer a high degree of electrical and thermal efficiency.

Simple, inexpensive fittings are available for use with Alcoa Aluminum Bus. Standard construction methods are employed; joints may be welded or bolted. If you are considering the installation of bus bars, write to us for recommendations. ALUMINUM COMPANY OF AMERICA, 2164 Gulf Building, Pittsburgh, Penna.

THIS IS HOW

HOTPOINT helps you sell Electric Water Heaters



. . . AND NO WONDER WE SELL MORE HOTPOINT ELECTRIC WATER HEATERS

1 **"All of us dealers are alike** in one respect—we'll take all the sales promotion help we can get. And, believe me, we get plenty from Hotpoint! Always have. That's why Hotpoint has always been out in front, I guess, in electric water heater sales.

2 **"Look at the Hotpoint Window Display Material,** for instance. It's colorful, dynamic—really stops people and brings 'em in. But that's not all! Hotpoint gives us floor displays, decorative signs, banners and a great variety of hard-hitting material that builds sales.

3 **"Hotpoint's Direct Mail Material** actually carries the story of modern electric water heating service right into people's homes, and it's so good that, all by itself, it stirs people to buy. Yes sir! Hotpoint gives dealers more help than any manufacturer I know of . . .

. . . including National Magazine Ads, a series of Newspaper Ads and Posters that "pull" business. And Hotpoint offers novel Water Raters, Visualizers, Salesmen's Contest Material, Sound-Slide Films—just about anything a dealer could ask for to help him sell!

5 **"You bet it's wonderful!** But—great as it is, it wouldn't mean a thing unless it was all built around an Electric Water Heater bearing the famous Hotpoint name. People have confidence in Hotpoint—have had for 30 years. It's best to concentrate on Hotpoint."

THE VOGUE. Hotpoint's **RECTANGULAR**-type Water Heater, now standard of the industry and increasing in public popularity, combines smart styling with Hotpoint's proved economy and efficiency. **THE MASTER** round models, equally efficient, are also available.

OTPOINT doesn't merely promise—Hotpoint delivers! And this year Hotpoint delivers a brilliant line of electric water heaters, backed by the greatest array of sales promotion you've ever had. Cash in on the current boom in home building and modernization. Hotpoint Electric Water Heating and profit! Get busy now—today!

N GENERAL ELECTRIC APPLIANCE COMPANY, INC., 5614 West Taylor Street, Chicago, Illinois

Calrod

Hotpoint's bakelite-sealed, airtight heating unit is immersed directly in the water inside the tank. All heat generated is delivered directly to the water. There is no flame—no fire hazard—no waste.

UTOMATIC
LECTRIC

Hotpoint

WATER
HEATERS

RIC RANGES • REFRIGERATORS • WASHERS AND IRONERS

A Program that Ends with a BANG!

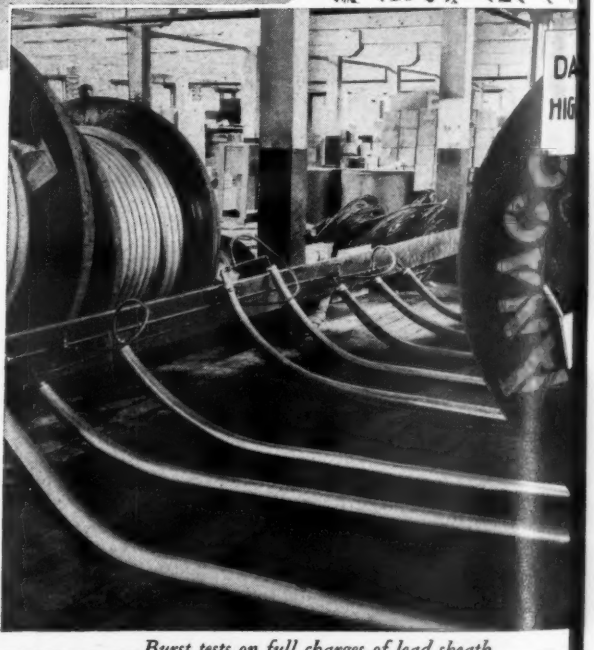
Abnormal pressure destroyed this lead sheath. Internal pressure tests show weaknesses that can be corrected.

Methods followed in cable sheath research start at the microscope; end in the high pressure room!

FOR many years now, Anaconda engineers have been aiming at perfection by applying the results of research to improve lead cable sheaths.

In addition to our exhaustive microscopic, physical and chemical tests on lead, huge test samples of lead sheath weighing close to one ton are prepared and subjected to both high and low internal pressures. The effect of stop marks, welds, eccentricity and other manufacturing variations are observed. The factor that proves weakest under this variation of stresses is soon found and corrected so that in service almost any extraordinary condition can be met with a wide margin of safety. In applied research of this kind is the origination of your guarantee that wires and cables bearing the Anaconda trademark are of the highest quality.

ANACONDA



Burst tests on full charges of lead sheath.

USE MODERN IMPROVED **Anaconda Wire & Cable**

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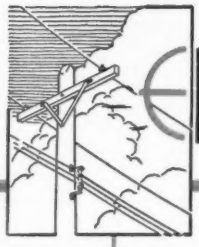
APRIL 1940

Volume 20 No. 4



ELECTRICAL SOUTH

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KITTY: "Why did Dad talk to me like that, Mom—I didn't do a darned thing."

MOM: "I know, Kitty honey, your dad's upset because the water heater is actin' up again. That's why I'm heating water for Gramp's hot water bottle."

DAD: "You say all I have to do is install the G-E and forget it. That sounds too easy to be any good. What's the catch?"

SALESMAN: "There is no catch, Mr. Dugan. If you'll step over to the chart, I'll show you."

MOM: "Well, of all things—that's Gramp singing in the bath tub!"

GRAMP: "She'll be comin' round the mountain when she comes. She'll be wearin' red pajamas when she comes. She'll be drivin' six white hosses . . ."

See This DRAMATIC NEW G-E WATER HEATER PICTURE!

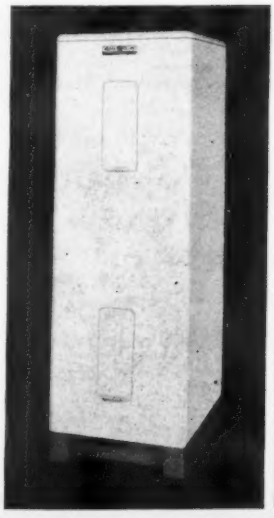
The General Electric Water Heater line is *complete.* Sizes for every need—from 2 to 140 gal. capacity. Rectangular, round, table top, wall type models. Monel or galvanized. Single or twin units.

●

All G-E Water Heaters have the famous

CALROD

immersion type heating units. Calrod heats water by direct contact, cheapest electrical method known. Durable, trouble-free. Will not scale or rust.



JUST ONE OF THE MANY NEW G-E WAYS TO MORE WATER HEATER SALES

Your G-E Appliance Distributor has something *red hot* to show you! It's General Electric's new full length sound slide film "We Like It Hot!"—and it's a *"natural"* for water heater sales. See it—and you'll see why! And see General Electric's many other new "props" and plans to get more water heater business . . . .

1. A big, new, profusely illustrated Sales Presentation Book. **2.** A new and entirely different Sales Manual in which interesting pictures take the place of dry text matter. **3.** A new Wall Display Chart and Visualizer. **4.** The new and novel G-E Heater-Meter. **5.** And the sensational new film "We Like It Hot!" Phone your G-E Distributor NOW and *see for yourself.*

GENERAL ELECTRIC COMPANY, APPLIANCE AND MERCHANDISE DEPT., BRIDGEPORT, CONN.

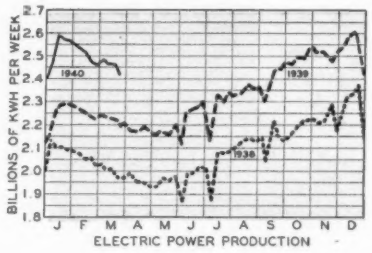
GENERAL ELECTRIC

Electrical Business Trends

GENERAL business conditions in the South continued better during the months of January and February than in the same months a year ago. February changes in the Southeast, according to the Federal Reserve Bank of Atlanta, were more favorable than those of the country as a whole with the exception of construction contracts and textile mill activity.

In the first two months of 1940, the distribution of merchandise through department stores in the Southeast was 9.9 per cent greater than in that part of last year.

This improvement in general business conditions in the South was reflected particularly in substantial increases in appliance sales. Domestic refrigerator sales in the 16 southern states totaled 45,879 units in January 1940 as compared with 34,089 units in January 1939, an increase of nearly 35 per cent. Sales in December 1939 amounted to only 20,298 units. National sales of refrigerators totaled 234,662 units in January 1940 as compared to 161,071 in January 1939 and 92,479 in December 1939.



ELECTRIC POWER PRODUCTION

Per Cent Changes 1940 Over 1939	Week Ending Mar. 23	Week Ending Mar. 16
New England	+ 4.1	+ 6.3
Middle Atlantic	+ 8.0	+ 8.3
Central Industrial	+13.8	+13.5
West Central	+ 7.5	+10.7
Southern States	+ 8.4	+10.8
Rocky Mountain	+15.0	+18.0
Pacific Coast	+ 4.1	+ 5.5
Total	+10.3	+10.6

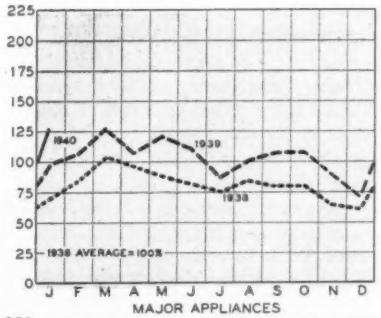
Increases almost as large were noted in range sales. In southern states, January 1940 sales amounted to 10,096 units, in comparison with 7,286 in the same month last year, and 2,948 in December 1939. Corresponding figures for the country as a whole were 39,496, 30,363, and 14,453.

Household washers shipped in January aggregated 119,228, compared to 109,909 in the same month of 1939. The southern states have been expanding rapidly as a market for washing machines, sales during January amounting to 20,950 units.

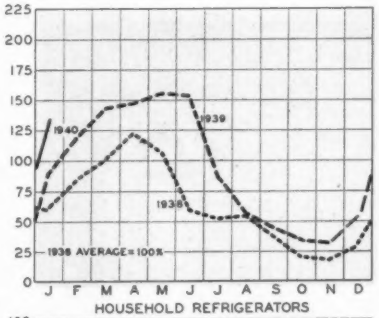
* * *

Sales of electrical wholesalers made a good showing in January in comparison with wholesalers' sales in general. Although the sales of all classes of wholesalers increased 10.3 per cent in January over the same month last year, the sales of the electrical group were up 23.7 per cent over January 1939. Electrical wholesalers' sales were down by 27.1 per cent, however, from December 1939.

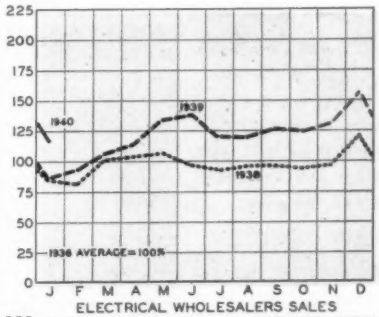
Electrical wholesalers in the West South Central states fared best in January with an increase of 28.8 per cent over January 1939. Increase in the East South Central states was 12.2 per cent; in the South Atlantic states, 9.3 per cent.



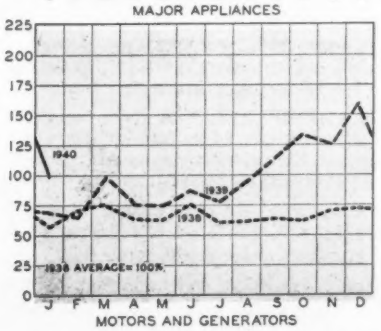
MAJOR APPLIANCES



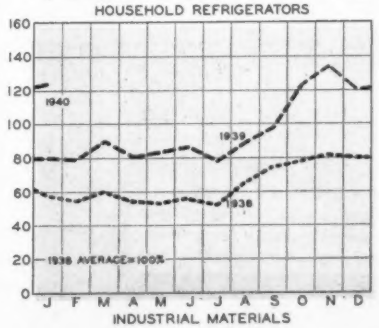
HOUSEHOLD REFRIGERATORS



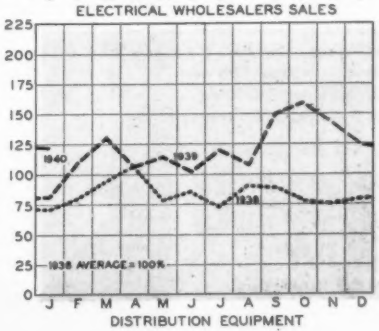
ELECTRICAL WHOLESALERS SALES



MOTORS AND GENERATORS



INDUSTRIAL MATERIALS



DISTRIBUTION EQUIPMENT

All of the above indexes of electrical business activity are based on figures available from the National Electrical Manufacturers Association, except the index of electrical wholesalers' sales which is based on data published by the United States Department of Commerce. The indexes on motors and generators and distribution equipment are based on orders received, while the index on industrial materials, including such items as electrical porcelain, mica, vulcanized fiber and laminated products, is based on sales billed. The index on distribution equipment includes such items as high voltage insulators, paper cable, power switching equipment, power distribution transformers, and varnished cambric cable. The index on major appliances does not include refrigeration and is based on sales billed. The index on household refrigerators includes complete household refrigerators, separate household evaporators, and separate systems of 1/4 horsepower or less. The index on electric power production is based on data released by Edison Electric Institute.

THERE'S NOT ANOTHER STOVE MADE LIKE THIS HOTPOINT.. SEE WHAT I MEAN?
THE ELECTRICIAN in Hotpoint's sensational new feature-length sound movie, "BLAME IT ON LOVE," puts more good old down-to-earth "sell" in his explanation of the Hotpoint Electric Range than you could ever imagine—and it's NOT high pressure. Write for information about this great promotion today!

Hotpoint Retailers Cheer

Besides the great "BLAME IT ON LOVE" promotion, Hotpoint gives you a grand new line of range models with Measured Heat, the outstanding electric cooking feature of the year.

THE NEW CENTURY
—a price leader with:

- **New self-cleaning Calrod.**
- **One-piece top of stain-resistant enamel.**
- **Three Select-a-Heat Calrod units with 5 Measured Heats.**
- **Oversize 6-qt. Thrift Cooker.**

MADE TO RETAIL AT

$99.50

in most localities

(Lamp and timer available at slight additional cost)

THE CENTURY. *A 39-inch automatic electric range with Hotpoint quality features at lowest price in Hotpoint history.*

HOTPOINT Appliance retailers from coast to coast have applauded and acclaimed Hotpoint's new feature-length sound movie, "BLAME IT ON LOVE," as the greatest electric range promotion event in appliance history.

And there is good reason for such overwhelming enthusiasm because . . .

- BLAME IT ON LOVE makes YOUR store the center of appliance buying in your community—develops store traffic because people come to YOUR showroom for free tickets to the big show—focuses the spotlight on YOUR store as headquarters for Hotpoint Electric Appliances.
- BLAME IT ON LOVE dramatizes, glorifies and sells electric cooking and the Hotpoint Electric Range as it has never been sold before.
- BLAME IT ON LOVE gives you the opportunity of a lifetime to tell a 54 minute uninterrupted story about Hotpoint Electric Ranges to an audience which you select yourself. Makes your selling job easier.

Plan now to lead the parade in your town! Stage the BLAME IT ON LOVE promotion. Ask your distributor for details or write

EDISON GENERAL ELECTRIC APPLIANCE CO., Inc.
5614 West Taylor Street, Chicago, Illinois

ELECTRIC **Hotpoint** RANGES

REFRIGERATORS • WATER HEATERS • WASHERS AND IRONERS • CLOTHES DRYERS • DISHWASHERS • ELECTRACLEAN

Duke Power Salesman Tells How to Sell

Electric Water Heating

By H. H. Orr, Jr.
Commercial Manager, Duke Power Company, Greenville, S. C.

JUST before a sale begins, I gather certain useful information. From the ledgers, I have copied over one hundred electric water heater bills. After each heater I have kilowatt-hour consumption, with bills in dollars and cents for the last twelve months. These I have grouped in sections so I can produce a list of names at any time with many users known by the prospect in his section of town. I have also grouped the smaller bungalows together, and the larger homes together and averaged these type heaters up over a period of a year.

Thus, I never answer the question: "How much is the operating cost?" I merely hand my prospect the operations sheet for similar homes and people they know, telling them there is no use guessing, that here are the actual bills, user's name, address, and time. This is definite—not vague or general. It always satisfies the question and washes out doubt that must be overcome before the sale can be made.

On other occasions, I have averaged all of the heater bills on one street and sent out personal postcards to all non-users saying there are so many heaters on Jones Street and their average cost is only a few pennies a day.

Selling Tools

This year, in one block, I had fourteen users out of a possible twenty-eight homes so I had blueprints made of the block with notations of where the electric heaters were located. Then I showed these prints to the fourteen other non-users and many other skeptical prospects who still thought electric heating of water was in the experimental stage. This print amazes them and gives them the idea that perhaps, after all, they are using semi-primitive means of heating water.

Those users who have voluntarily thanked me for selling them a heater (and there have been many) have gladly given me testimonial letters. I find that showing these letters to the prospect and asking him to call any of the many users is good practice for this will usually dispell any doubt about the only perfect way of heating water, for many times he recognizes intimate friends in the user group.

I put these tools in a good leather portfolio (not too large to attract undue attention) that contains a tape measure, candle and paper clip, manufacturer's catalog and specifications, facts about hot water (temperature and uses), a blueprint of the various ways of connecting, and a sample heating unit. Also effective is an X-ray visualizer of the heater in its various phases of construction, a thermometer and attractive hand out pieces.

I have found it wise to know the summer, winter, and mean temperature of the local tap water, together with a working knowledge of how many gallons of water one kwhr and one cent will heat. I make sure that these tools are placed in good working arrangement so I will not "act like a blind dog in a meathouse" when I need information. Prices of the various size heaters I learn and memorize immediately.

In the meantime, my company and the manufacturer have been giving me valuable helps in the form of newspaper ads, radio, direct mail and hand delivered broadsides. They have furnished me handout pieces and very attractive literature which is most effective if used properly. Lately, I have been more and more aware of national advertising, a help that cannot be overestimated, both promotional and brand advertising doing a certain job for me by continually punching my prospects.

I have heard many experts say that direct mail advertising has never made a sale in itself, but I am inclined to believe that if my prospect list is a good list then there will be from one to three per cent direct sales made by this pounding, before I can even get a chance to get around to all of my prospects.

THIS article was condensed from a prize winning letter in a national contest conducted by the Modern Kitchen Bureau on "How I Sell Electric Water Heaters." The contest extended throughout 1939 and prize winning papers were selected each quarter. Mr. Orr's paper was selected as grand prize winner over all entries. Although he was employed as a salesman at the time he submitted his splendid sales letter, Mr. Orr has since been made commercial manager of the Greenville, S. C., branch, of Duke Power Co.

My wealth of sales helps mean that I do not have to depend on a set canned sales talk but have many things on the tip of my tongue in case I have the opening for an effective use. The tools I have found essential, but I must use judgment and flexibility to get the most good from them. I must not only know what tool to use, but how, and when to use it.

Of course, it is best to call on the prospect at the psychological time when his or her mind is on hot water or the absence of hot water. This can usually be done on recalls but I have found that to be successful I must call on all prospects on every street and make it a habit every day. I plan the night before and make out a list of prospects on one street. Next morning I leave our salesmeeting at about nine o'clock, drive out to my selected street, park the car, and start out.

Usually I find that the man generally signs the contract for the water heater. However, this time from nine to twelve o'clock in the morning is next in importance to the actual closing of the sale for here your prospects are weeded out in their importance and need of appliance.

I try to dress neatly and conventionally, and realize that the few minutes after I ring the bell (not long or loud) are the most important minutes of the entire sale. The first impression is usually lasting and I must be especially smooth and pleasant to avoid any irritation on my first call. Many times the prospect is in a bad humor, busy or has been already disturbed by house to house men who do not offer such a legitimate service as I am offering. However, I have the advantage of other salesmen because I know the prospect's name, her electric bill and I represent a company that has much public good will and is known for its ethics and lack of high pressure methods.

First Approach

When the homemanager comes to the door, I smile and introduce myself: "Mrs. Jones, my name is Henry Orr, Jr., (never Mr. Orr to a prospect) with the Duke Power Company. May I come in?" I have found that these four words get me in over fifty per cent of the time, even with a total stranger at the door. *I have found that selling anything through the door is next to impossible.*

If a servant comes to the door, I state that I am Mr. Orr of the Duke Power Company and would like to see Mrs. Jones. Very often the servant comes back and asks what I want. I find this one of the hardest situations to get around for I have never believed in using trickery, or misrepresenting myself as a free service man, or pretending that I got the house mixed up with the next house, for after all, I have a very beneficial advantage and service for the prospect and I am not ashamed of it. Usually people who employ servants in my territory have electric ranges and with few exceptions when an electric water heater is installed their range bills decrease so I am sincere when I send word by the servant to Mrs. Jones that her bill has been averaging so much and I would like a few minutes to tell her how I can cut her cooking bill by our *special* water heating rate. This is true in my territory for nearly all electric range owners heat some quantity of water on their ranges. In some cases, the decreased cooking bill has nearly offset the water heater bill. This also applies to all types of stoves. I find that mentioning the prospect's own money usually creates interest.

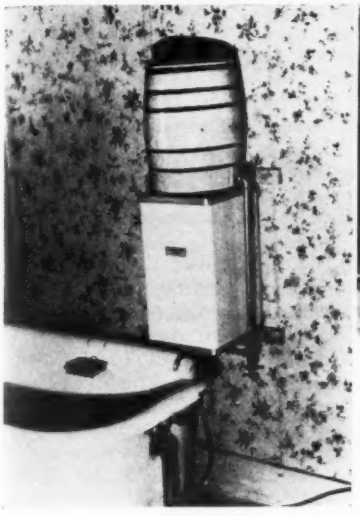
If at the front door on my first call, I get a stall, or the prospect is truly busy, ill, just fixing to go out, or has company, then I ask for an appointment at the earliest convenient time when husband and wife are together. I do not try to force my entrance. Usually the prospect senses that I am no ordinary canvasser for I know her name, and furthermore, have been studying her electric bill.

The first thing I do is to try to get Mrs. Jones thinking of the deficiencies of her method of heating water without knocking that method. In other words, I don't come right out and say "Mrs. Jones, your heater is terrible," instead, I try to lead her into telling me that she has a hot water problem. I have found that when one knocks the prospect's particular type of water heater that invariably the prospect will rise to defend her possessions, and sometimes, get quite angry about the matter.

On the other hand, instead of telling her that her heater is awful, I have received far better results by asking her if their heater didn't cause her a lot of extra trouble and worry without giving her the service she would like. Invariably, she will open up and tell me of the nuisance, dirt and the many disadvantages that I have not even been aware of, provided I know how to put the question to her in the right way.

Sometimes, I tell of one of my users, who before buying his electric heater had a splinter fly into his face, or fell down the steps, or was continually hitting his head on the rafters, or whose heater

Typical water heater display maintained on the Duke sales floor.



The small water heaters now available are opening up a new market for this appliance in low-income homes. Here are three typical installations on a single farm; left to right, in bathroom, kitchen, and stock barn. (Photos courtesy General Electric.)

heated up the kitchen so awfully hot, or who always had to wash up after firing his heater, or who forgot to turn the dern thing off —unless you see their equipment, you can never tell which one of these barbs will go home.

Often, I am told that since the prospect has a servant, that they may as well fire the heater and there is no need for an automatic type since the servant might as well be doing something. I finally learned to overcome this objection by pointing out that good servants are hard to get, and harder to keep, which is readily admitted. I tell them that the servant will be much better satisfied, can do her work better and quicker, that usually the servant does not come early enough in the morning to get Mr. Jones' bath good and hot, and that in time of sickness or emergency at night there is no hot water.

During these morning talks with the housewife, I seldom go into the construction of the heater, leaving that to the man on my recall. Invariably, the first few words nearly every prospect will shoot at me are "What is the price?" I always try to remember that I must create values before mentioning the price and have found an easy yet sure way of getting around the question without animosity, by countering with the fact that there are many different sizes. Then I start asking questions about how many in the family, home laundry, babies, servants, water bill, number of baths, house guests, and other maximum day requirements. These questions give me much ammunition to use on my recall when husband and wife are together. These questions are not objectional when asked in the right manner, and they usually give the prospect a confidence in me as really being a water heating expert.

On these morning calls, I try to whet up the appetite, and then make an appointment for the same night, for I have found that when a family spends over a hundred dollars for an appliance, the husband and wife like to be together, and this is a definite advantage to the salesman because he can answer all objections and there can be no buck passing.

Sales are Closed at Night

On the morning canvass, I have tried to get an appointment late in the afternoon or at night when the prospect will be relaxed from the day's work and comfortable, with no detracting thoughts, and in an agreeable mood. Before I call, I must remember that just because electric water heating is old to me, and I know nearly all of its advantages, everything about them is new to my prospect. I should mention every detail that is an advantage to the prospect. I find this fault my greatest drawback, looking and hoping for something new, when I don't really need the last minute dope on water heaters but have endless material that is very effective.

Usually, at night, people do not feel as rushed and before I start on my sales story I try to find something about the prospect, their children, or their home that I like. This lends an air of agreeableness, when sincere, that is very beneficial to smooth sailing.

Sometimes, I start my story by mentioning that running cold water is such a wonderful advantage (farmers who have recently installed pumps fully appreciate this). The prospect usually looks a little puzzled and I go on and point out how fine it is to turn the cold water faucet and get cold water at any time of the day or night. Then I inform the prospect that there are only three vital uses of cold water—drinking, putting in ice trays, and washing off vegetables—whereas there are hundreds of uses of hot water. I show them a prepared list of some of those uses.

At the beginning and all during my story I let the prospect talk freely, and if there are objections, I never argue but overcome each objection thoroughly before dismissing it. For instance, if a prospect claims the operating cost is too high, I agree that his statement was true five years ago, before our special rate, but these actual bills of his friends will show him what a change has been made in the last five years. Perhaps his home is small and compact and I can point out that the hot water runs in his house are unusually short and that he would have an especially efficient installation.

Soon, I give him a complete presentation, naming all the advantages and explaining the construction. I stress the heater being automatic and what that means to him in that it can be installed and forgotten. I mention absence of any flue, its safety, convenience, because the water comes to him.

(Continued on page 58)

Selling the Contest To the Salesman

In this third article of a series on more effective sales contests, consideration is given to methods of maintaining contest enthusiasm.

IN previous discussions of the technique of running a successful sales contest, it has been shown that the sales executive's job is five-fold; he must establish a basis of competition, choose a contest, adapt it to his staff's individual nature, set up prizes, and sell the contest to the participants. The routine elements of this job have already been discussed: the most important of these five phases of a contest, however, is *selling the contest to the salesmen.*

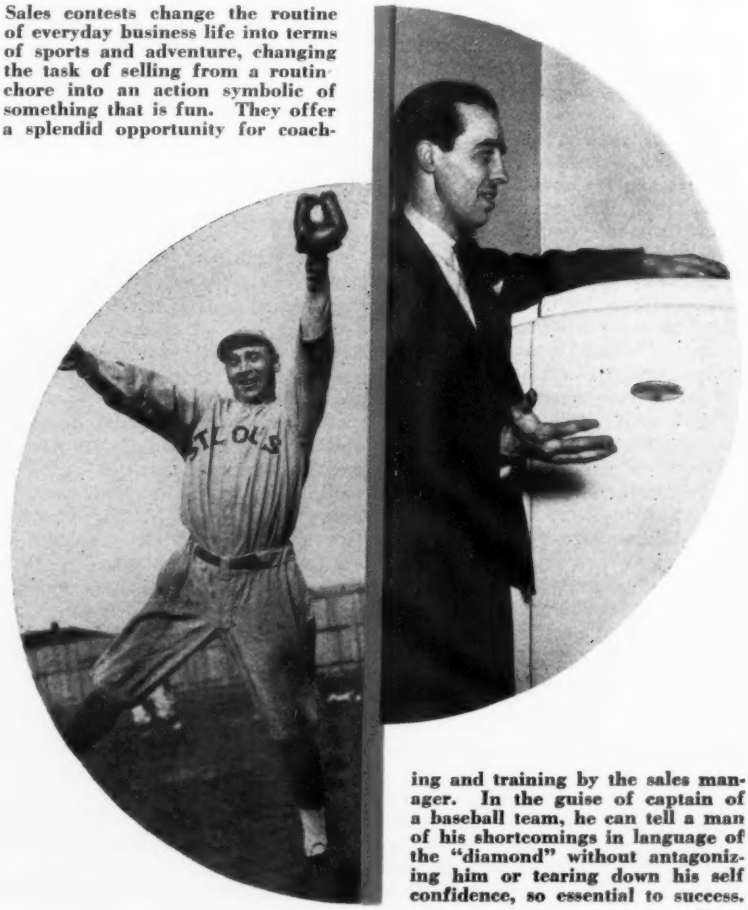
The basis of this job is found in an elementary principle of selling, and the fundamental law of advertising: "87% of human perceptivity is ocular", or, "show 'em something to sell 'em something". Just as you want your salesmen to use demonstrators or at least carry illustrated catalogues and literature, to sell your merchandise, so you must put something tangible in their hands in order to sell enthusiasm in your contest to them. The implements are two very simple devices: a scoreboard and a house-organ.

The necessity of a scoreboard is obvious: the importance of a salesman's standing in a contest isn't half as important to him if you just call him in and say, "Jim, you're in fourth place," as it is if there's a permanent, visible record of his standing out where everyone can see it, where its a daily reminder of how well he's doing his job. There's an incentive to make every man want to move his name up on the list, or to see the figure "one" before his name.

Further, the scoreboard should be more than a mere weekly posting of names: it should be a part of the contest, geared so that it plays a part in carrying out the illusion created by the contest guise. If the contest is a baseball game, then the scoreboard should be made up like a conventional baseball scoreboard, with the weekly scores becoming innings and so on. Further, its well to decorate the scoreboard a little: if no one in your office is artistic, hire a show-card writer to draw a few pictures of ball-players in action around the board. Total cost: 25c worth of beaverboard and a dollar for the art work. The board should be kept in a conspicuous place in the office during the entire length of the contest, and should be made the focal point of the contest. Any sales meetings, discussions, pep-talks or prize awards, should be held around the scoreboard, so that the importance of the contest is kept constantly in the salesmens' minds.

There is practically no limit to the ingenuity that can be exercised in designing a score board in keeping with the guise of the contest. A board of particularly clever design was described in the July issue of ELECTRIC SOUTH in an account of the range and waterheater sales contests conducted by the Savannah Electric and Power Company and the Florida Power Corporation, both along similar lines. In these campaigns, the contest became a yacht race along the Atlantic coast with the finish line at New York. Salesmen were issued sporty looking yacht caps to wear to sales meetings; prizes included steamer trips to the New York World's Fair.

The score boards were attractive maps of the Atlantic coast line and miniature yachts, each carrying the name of a salesman, were advanced from week to week in



Sales contests change the routine of everyday business life into terms of sports and adventure, changing the task of selling from a routine chore into an action symbolic of something that is fun. They offer a splendid opportunity for coaching and training by the sales manager. In the guise of captain of a baseball team, he can tell a man of his shortcomings in language of the "diamond" without antagonizing him or tearing down his self confidence, so essential to success.

proportion to the individual's sales progress. Of course, such colorful score boards should be supplemented by a board carrying all essential information such as the one reproduced here, for it is from the calculated standing of each man that the miniature yachts or other symbols can be advanced to proper position as the campaign progresses.

The other implement so important in selling the contest to the salesmen, the house-organ, is about as simply handled, and is the most important of all elements in keeping the contest alive. Letters from the boss, or memos, are quickly forgotten and discarded by a salesman, who is accustomed to them, but a colorful, cleverly written weekly bulletin, devoted entirely to the contest and the participants' progress, can become something eagerly awaited and read by everyone in the organization. Two factors go into the house - organ: the mechanical handling, and the editorial handling.

Mechanically, there's nothing to it. If your contest runs thirteen weeks, and you have twenty people in your organization, that's 260 copies. Make enough to go throughout the office staff as well; its a good idea to keep them interested in the salesmens' progress too. With an extra copy for filing, say 285 total copies to be made, about 22 each week. Have 285 "heads" made for the bulletin, and then have as many copies run off each week as needed. Ordinary 8½ x 11 note paper can be used, and the duplication can be done by carbon typing, ditto machine, multigraph, mimeograph or planograph. If your office doesn't have any duplicating machine, any mimeograph company will run off twenty copies for half a dollar or so.

In laying out the bulletin heads, again some care should be given their preparation: an artist should be called in to draw a head which looks neat and "official", which ties in with the theme of the contest in some way. This can be done on a mimeograph stencil, and the entire supply of heads run off later to be filled in each week by mimeograph with the weekly message. Some larger contest operators have their heads printed or planographed, then run off the weekly message on a duplicating machine.

One company, for example, decided to run a baseball contest during the baseball season: the staff became the "Cardinals," and the house organ was named the "Press Box." Suitable cuts were obtained from a local publicity department free of charge, and the attractive house-organ head was printed, with the weekly bulletin later mimeographed in. The cost was $4.50 for a 26 weeks' supply of bulletin sheets. If two or more pages are needed for the weekly issue (and they should be used), the second page can go on plain paper, and be stapled to the front page, or the heads can be run on 11 x 22 paper, which then can be folded to make a four-page 8½ x 11 folder.

If you're editorially minded, here's your chance to show your stuff. If you're not, appoint someone on the staff to run the paper. Editorial content should be about as follows: (1) A "lead" article describing in detail the outstanding sale of the week, always using the terminology of the contest, of course . . . "Joe Williams stepped up to the plate last week, and socked the old apple right out of the park as he landed an apartment house contract, and scored 24 runs for the refrigerator department . . . . . " (2) A resume of all salesmen's sales for the week, with brief comment on each. If they're lagging, don't hesitate to "rib" them, in good columnist style. (3) A complete publication of contest standings to date. (4) An editorial. The latter may take almost any form: it may be a sales training talk in disguise, it may be a worthwhile piece of comment taken from some publication, it may be some ideas you've had that you've wanted to get over to the men. Here, again, sales contests permit you to do things you can't do in sales meetings: the salesmen are going to be interested in "their newspaper," and they'll read it thoroughly. Some lectures that might not take effect in a sales meeting may be slipped over in the house-organ without anyone realizing that he is being lectured to.

The house-organ should be written in catchy, slangy style. This presents no hazard of journalism, for if its written as nearly as possible like a one-sided conversation, in conventional language, it will be

(Continued on page 59)

CONTEST RECORD - WEEK NO. 2

NAME	QUOTA	MULTIPLE	WEEK SALES	POINTS	TOTAL SALES	TOTAL PTS.	PLACE	
Jackson	500	.2	425	85	825	165	10	
Smith	450	.222	470	104	920	204	5	✓
Barnes	350	.286	350	100	650	186	8	✓
Collins	600	.166	650	108	1350	224	3	✓
Mathews	500	.2	550	110	1050	210	4	✓
Jones	475	.21	500	105	1000	210	4	✓
Williams	300	.333	350	115	600	197	6	✓
Horne	450	.222	400	89	850	189	7	
Jenkins	350	.286	300	85	600	170	9	
White	300	.333	400	133	740	246	2	✓
Cox	600	.166	750	125	1550	258	1	✓

The "score board" is a most important factor in any sales contest. This typical design, explained in detail in last month's article of this series, includes full information but should be "dressed up," carrying out the theme of the contest. The single check in the last column indicates quota made for the week—the double check designates those who have exceeded their quota for the entire elapsed period of the contest.

Keg of Pennies For Electric Range

THREE years ago, Stephen F. Klein, commercial salesman for Gulf Power Company, called on V. E. Stanton, who owns a grocery store in the little town of Century, Florida. Not overlooking any bets, Salesman Klein suggested that the Stantons install an electric range in their home. While talking about how convenient the electric range would be, Klein noticed a jar of pennies on a shelf behind the cash register and he asked what they were for. Grocer Stanton told him that he didn't like to ring up penny sales, so when some child bought a penny piece of candy, the penny was dropped into the jar.

Jokingly, Grocer Stanton stated that when he got a keg of pennies, he would buy an electric range. On his following calls at the Stanton store, Klein usually made some remark about the pennies which were increasing jarful by jarful. On a recent call, Klein told the grocer about an electric range being sold at a special price of $132.25. Two days later, Mr. Stanton appeared at the Pensacola store and told Klein that he had his keg of pennies and was ready to buy one of those $132.25 ranges. It took both men to carry the keg of pennies into the store where Mr. Stanton stated that there were thirteen thousand and two hundred of them, and he added a twenty-five cent piece to make the $132.25 payment.

Salesman Klein then proceeded to sell Mr. Stanton a table top storage type water heater on terms, probably to be paid for with the future accumulation of pennies.

There was considerable argument between Klein and the cashier as to who was going to count and wrap the pennies. Klein took them to a local bank, after closing hours, and with the assistance of a teller, they were counted and bagged on a counting machine—the counting requiring one hour and ten minutes.

Attic Fan Display Features Miniature Installation

A REALISTIC window display showing how one attic fan will cool an entire house has been used successfully by the Houston Lighting & Power Company, of Houston, Texas. This display features a miniature house built from heavy building board with a plaster-like finish. The attractive model home has a large section of the roof cut away to reveal an attic fan in operation.

The air current from the windows in this miniature house is pulled through all rooms and discharged through the louver. Strips of paper ribbon over the louver window keep in motion from the discharge flow of air . . . arrows point to the air intake and signs in the window explain the complete circulation and cooling effects of the air.

Actual and artificial shrubbery in the window makes this home attractive and realistic. Spot lights focus attention on the display day and night—a sign invites prospects to see their attic ventilation dealer.

Twenty Iron Models in Effective Display

THE source of a sales volume in electric irons which warrants a stock of one gross on hand at The Electric Shop of C. Schneider & Sons, Washington, D. C., is a repair department that offers a "while you wait" service and does a selling job at the same time.

The third generation of Schneiders now operates this appliance store which in the days of its origin sold lightning rods as the nearest approach to anything electrical. During the three generations, the Schneiders found out that it is neither necessary nor wise to retire with a repair job to the back room where the customer may be kept in the dark as to how simple it is. Much more can be accomplished by doing the job on a service counter where she can stand by and watch or sit in a comfortable chrome and leather chair while you sell her on the idea of having two irons in case one breaks down in the middle of a big ironing job.

This is one of the ways the Schneiders have built up to a stock of one gross of irons and a display counter of 20 models, a selection

(Continued on page 26)

Women on the Sales Force

Account for greatly increased volume in range and laundry equipment sales

AN increase in volume of 500 per cent within six months is the record just established by the electrical appliance department of the Pizitz Department Store, in Birmingham, according to W. C. Allen, newly appointed manager of the department. Although the sales floor is kept well manned, the greater part of this increased business is from outside selling by a sales force that includes a number of women.

"As well as I can determine, much of our increase in business has resulted from the use of saleswomen for regular outside canvassing and demonstration," reports Mr. Allen. "The sales record for washing machines has been especially good. Women are naturally suited to appliance selling, especially to selling washing machines. They have less difficulty in getting into the home, and after getting in, they are better able to enter wholeheartedly into the discussions of the problems of the home, which most of them understand by actual experience.

The Pizitz Appliance Department uses mature women and, strange as it may seem, prefers women who are actually engaged at the moment in running their own homes—housewives. A woman who is actually engaged in housekeeping, the manager believes, is going to be more interested in the products and more enthusiastic in discussing them.

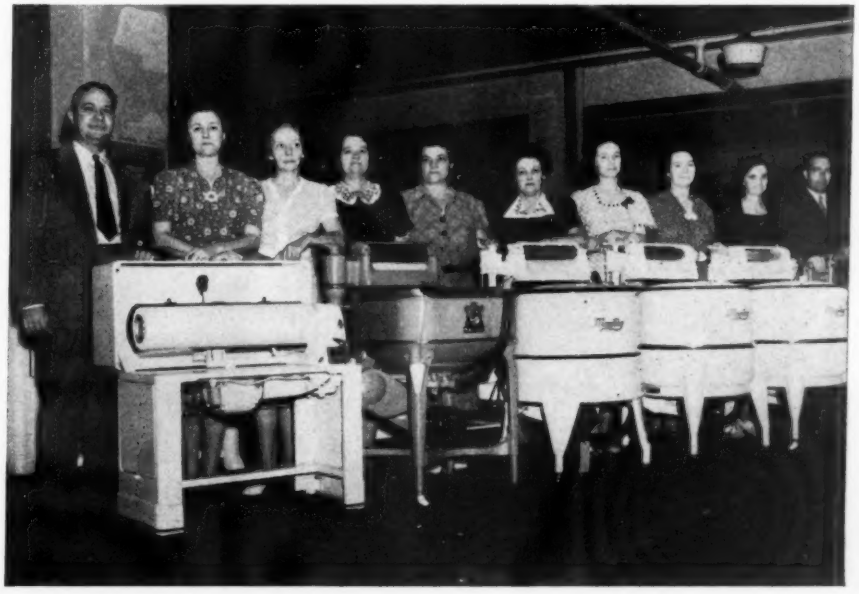
The greatest difficulty, it was explained, was in obtaining mature women, as most mature women have responsibilities that prevent them from working. But in a town large enough, said Mr. Allen, there are sure to be many mature women who need money and are willing to work for it. As a matter of fact, the Pizitz Appliance Department has been able to keep a full force of women of this type employed. Mr. Allen has found that because of their maturity and the need for a job suited to that maturity, these women make the most consistent and dependable workers.

Of course, it was learned that most of these women needed training but this problem was easily handled. The department provides extensive and continuous training with the entire sales force meeting every morning for a brief training period.

"Our morning meetings are not just pep meetings," explained Mr. Allen, who holds the opinion that it is possible to give out too much pep backed with too little basic training. "We go in for basic, consistent training that gives the salesman a knowledge of the work and its daily problems. I am not looking for 'flash-in-the-pan' selling by the type of salesman who often gives a brilliant performance on one day which is followed by several days of slump and depression. I place emphasis on consistent selling based on rock bottom training and believe that this training should be daily and continuous. You may not get as many flashes this way as you do from pep meetings but I am certain from my own experience that frank treatment of the problems to be met in training makes for more volume in selling in the end than the false stimulus of high pressure pep meetings."

The Pizitz training plan includes actual cooking and washing as it should be done for demonstration. However, the basic training is built on Mr. Allen's theory of five important steps or ques-

(*Continued on page 59*)



This group of saleswomen employed by the electrical appliance department of the Pizitz Department Store, of Birmingham, have been largely responsible for a very marked increase in sales volume. Since most of them are engaged in housekeeping themselves, they have been unusually successful in selling ranges and laundry equipment.

Distribution Panelboard Wiring For Adequacy and Safety

By M. M. Brandon
Associate Electrical Engineer
Underwriter's Laboratories, Inc.
New York City

THE connection of the circuit wiring to panelboards and other distribution devices is relatively simple for a good electrician, but if one may judge from an examination of panelboards in actual service, the fire protection principles in the segregation and arrangement of the wiring are not so well understood. Some discussion from this standpoint may therefore be helpful.

The ideal wiring arrangement for panelboards is achieved where the main line conductors and the branch-circuit conductors enter the cabinet opposite their terminals and are carried in a straight line to those terminals.

Such an arrangement results in absence of crowding together of wires of opposite polarity, minimum heating for the wiring, and little chance of wires coming into contact with uninsulated line terminals of opposite polarity.

This ideal arrangement is seldom achieved in actual installations. In some installations, the branch-circuit wires are carried from the terminals on one side through the wiring gutter to the other side of the cabinet where they enter the conduit. In other instances, the wires from the terminals on the side of the panelboard are carried to the top or the bottom of the panelboard before leaving in the conduit conveying them to the ultimate load or to other distribution centers, and the main line conductors are sometimes brought in at the sides of the cabinet or at the opposite end from the main line terminals thus necessitating the running of a considerable amount of wire inside the cabinet.

Use of Wiring Gutters

The wiring gutters provided to take care of this mass of wiring are considered very much as any raceway is considered and there are two cardinal principles to be met. The first principle is the provision of a separate compartment of adequate cross-sectional area to house the conductors and to protect them against mechanical injury, and the second is the elimination from this wiring compartment of any uninsulated live parts. Neutral terminals not directly connected to the enclosure are judged as live parts.

In designing a panelboard that is intended for installation under the requirements of the National Electrical Code, a manufacturer must take both of these principles into consideration; and while, in theory, this is simple, in application it may lead to a number of complications. As a guide, the manufacturer has the National Electrical Code, paragraphs "c" and "d," of section 103706, of the 1937 edition, and the "Panelboard, Service Equipment, and Cabinet and Cutout Box Standards" of Underwriters' Laboratories, Inc.

To assist in an understanding of the Code requirements, they are quoted here:

"c. Wiring Space—When Required. Cabinets and cutout boxes which contain devices or apparatus connected within the cabinet or box to the conductors of more than 4 circuits, including branch circuits, meter loops, sub-feeder circuits, power circuits and similar circuits, but not including the supply circuit or a continuation thereof, shall have back wiring spaces or one or more side wiring spaces, side gutters or wiring compartments, unless the conductors

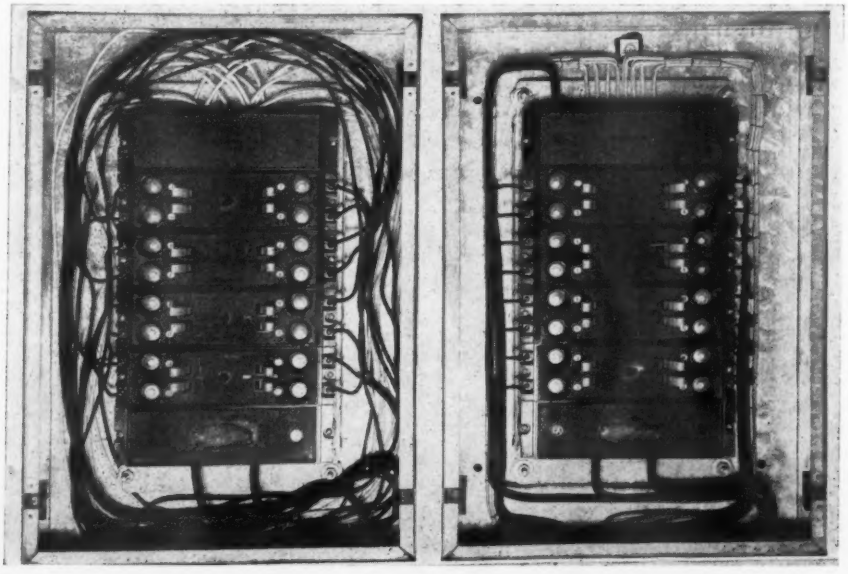


Fig. 1. No matter how carefully the manufacturer designs his panelboards, their ultimate safety will depend to a considerable extent upon proper wiring in the field. Although he provides the wiring space for a reasonable and likely type of installation, sloppy wiring may nullify the advantages of good design. Of these two installations, the workmanlike job at the right is the safer and least likely to have breakdowns.

leave the cabinet or cutout box directly opposite their terminal connections.

"d. Wiring Space—Enclosure. Side wiring spaces, side gutters or side wiring compartments of cabinets and cutout boxes shall be rendered tight enclosures by means of covers, barriers, or partitions extending from the bases of the devices, contained in the cabinet, to the door, frame, or sides of the cabinet; provided, however, that where the enclosure contains only those conductors which are led from the cabinet at points directly opposite their terminal connections to devices within the cabinet such covers, barriers or partitions may be omitted. Partially enclosed back wiring spaces shall be provided with covers to complete enclosure. Wiring spaces that are required by paragraph (c) of this section and which are exposed when doors are open, shall be provided with covers to complete the enclosure."

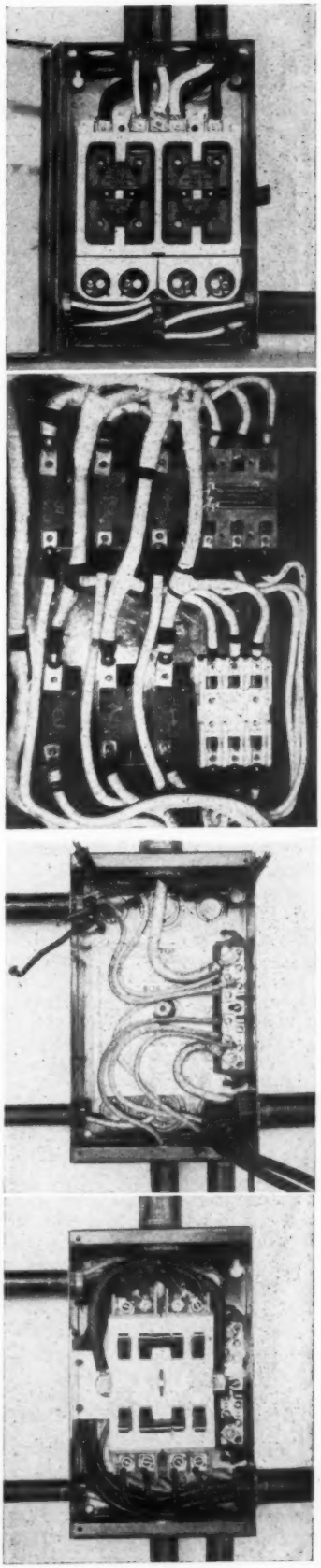
It will be noted that these provisions call for complete enclosure of the wiring even when the cabinet doors are open, where more than four circuits are involved. There is no particular virtue in the four circuit limitation, that number being chosen as a practical and reasonable division point above which the number of wires involved is apt to create congestion and increase the likelihood of injuries to the conductor insulation through crowding into a small space or compression between the door and the cabinet box.

The amount of wiring space needed, of course, is determined by the number of wires which may be run therein and this in turn is determined by the number of circuits and whether or not the panelboard is of the feed-through type where the main conductors feed through in order to supply other panels, or whether the panelboard is of the simple distribution type in which the feeders terminate at the panelboard. The values for different sizes and numbers of wires are worked out and included in Underwriters' Laboratories' Standards.

Contractor's Responsibility

A manufacturer desiring to label an enclosed panelboard, enclosed branch circuit cutout, or service equipment, where both the panel and the enclosure are provided as a unit at the factory, must provide the necessary wiring space, but where assembly in the cabinet is not made until the field installation is made, it will be necessary for the contractor and the electrical inspector to see that the proper space is available. This need not be the theoretical space called for in Underwriters' Laboratories Standards, because the wires are actually in place and a glance will tell an experienced electrician or electrical inspector whether or not there is too much crowding.

From top to bottom: Fig. 2. A small distribution panel for use at services, properly wired. Fig. 3. This panelboard is not only improperly wired but was improperly designed in the first place. Figs. 4 and 5. These small distribution panels are provided with back wiring space. If that space is used, there is ample room for wiring, but side wiring alone in these boxes would result in a crowded, unsafe installation.



It should be noted here that the manufacturer is required to provide side or back wiring space only for a reasonable and likely type of installation and that no matter how carefully the panelboard may be designed from that standpoint, it can be so wired in the field as to completely nullify the careful design. In Fig. 1, for example, are two illustrations of panelboard wiring. A glance will indicate the workmanlike job in one case and the unworkmanlike job in the other; and here, as in all other electrical work, the carefully wired installation is the safer and less likely to have breakdowns.

Barriers Provided

Fig. 2 shows a small distribution panel for use at services. It is properly wired and, in addition, the manufacturer has placed small barriers on each side to indicate that these areas are not intended as wire passages. The barriers are readily removable and a wireman could place wires in the small side spaces, but obviously in so doing, he would not be complying with the provisions of the National Electrical Code calling for adequate wiring space.

Fig. 3 illustrates not only an improperly wired panelboard, but also one that was improperly designed in the first place. There are no provisions for segregated wiring gutters. Fortunately, panelboards of this type are largely a thing of the past.

Figs. 4 and 5 illustrate small distribution panels with back wiring space. If that back space is utilized, there is ample room for the wiring, while if the back wiring space is not utilized, the side

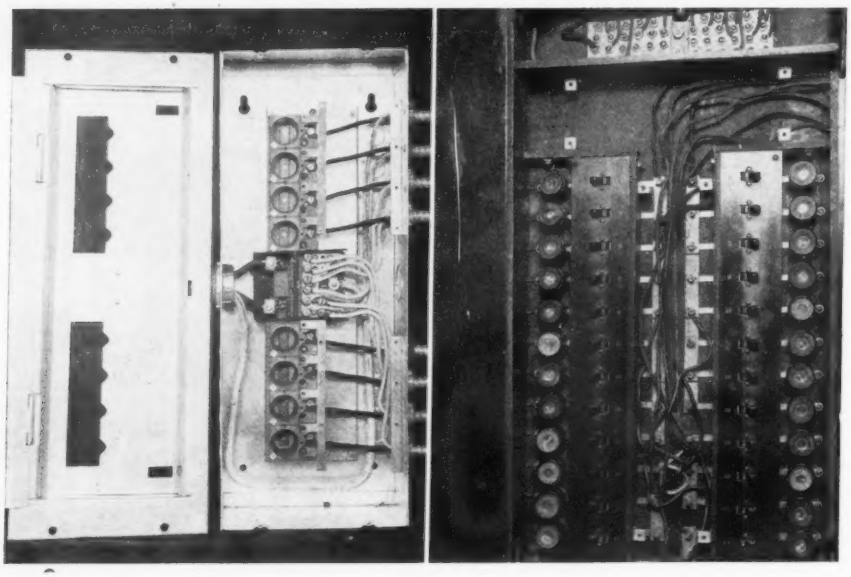


Fig. 6. (Left) A panelboard, cabinet and wiring gutter enclosure. Note the wiring space on the right to permit the wires to leave from the right when this is desired. Fig. 7. (Right) Not uncommon is this abuse of the principal of placing no uninsulated live parts in the wiring gutter. The panel shown is of the metering type and the bus bars in the center are of opposite polarity.

wiring space would be inadequate and a poor job would be the result.

On the other hand, there are some back wired type of panelboards that have ample room for the wiring but which do not have adequate closure of the wiring space on account of the unclosed gap between the edge of the panel and the walls of the box. This opening permits direct access to the wiring in the back and also may permit the projection of loose wires with the possibility of injury to the insulation when the door of the cabinet is closed.

Fig. 6 shows a panelboard, cabinet, and wiring gutter enclosure. The wiring space on the right is to permit the wires to leave from the right when desired. Many enclosures are made without this extra gutter and therefore the wires should leave only from the one side where ample gutter space is provided, or from the top and bottom. Attention is also called to the provision for switches which may be placed in the trim at such time as circuit switches are needed. This provision for the addition of switches on the load side of the fuses will be ruled out in the next edition of the National Electrical Code, if the recommendations of the Electrical Committee on this point are adopted.

Segregation of Live Parts

The elimination of uninsulated live parts from the wiring gutter is largely accomplished by the original design of the panelboards and is not so subject to change on account of improper wiring. In the older types of panelboards, this segregation of live parts and the wiring gutter was accomplished by means of barriers having small openings opposite the wiring terminals to permit the passage of the wires between the wiring gutters or compartments and the terminals. This construction was superseded in the moulded types of panels by small individual barriers between each terminal, the barriers being high enough to prevent wires of opposite polarity from resting on the uninsulated live terminals. This type of construction is well illustrated in Fig. 1.

The neutral terminals are set off by barriers so that wires are not likely to be pulled across them. See Figs. 6 and 7.

In Fig. 5, an uninsulated wiring terminal is shown on the left and if the panel is wired properly, no wires of opposite polarity will be in contact with this terminal, but if the wires shown in the back wiring space were placed in the side wiring space on top of the metal strip shown, they would be in contact with the uninsulated terminal of opposite polarity and an undesirable situation created thereby. If there were room for some of the wires, as seems evident from an examination of Fig. 5, and wiremen were unfamiliar with the basic idea of keeping uninsulated live parts out of the wiring gutter, such routing of the wires might be attempted, but no one familiar with the principle just enunciated would consider such wiring.

Fig. 7 shows a not uncommon abuse of the principle of no uninsulated live parts in the wiring gutter. The panel shown is of the metering type and the bus bars in the center channel are of opposite polarity. The wires of opposite polarity are run over the live parts indiscriminately and while this particular panelboard and some like it in the same building have not, as yet, so far as is known, broken down on account of this slipshod method of wiring, the possibilities of trouble are greater than if adequate segregation of wires of opposite polarity were obtained.

Making Safe Installations

It is only by rigid adherence to fundamental engineering principles such as this that breakdowns in distribution panels can be minimized and both contractors and electrical inspectors should work together with the realization that they have a joint job to do in obtaining proper wiring, and that no matter how carefully a panelboard is designed, much of the benefit may be lost by improper installation.

It may also be well to point out that the label of Underwriters' Laboratories, Inc., on a panelboard indicates merely that the panelboard is so designed and constructed that it can be installed in a safe manner in accordance with the provisions of the National Electrical Code, and that dependence cannot be placed in the label alone to the exclusion of proper installation.

Bank Lighting with Fluorescents

Fluorescent lamp application for general lighting solves problem complicated by low ceiling and exposed duct lines

By W. J. Burton

Lighting Engineer, Duke Power Company, Greensboro, N. C.

OF the many recent developments of the lighting research laboratories, none has attracted public fancy as has the fluorescent lamp. However, until recently, the majority of installations of flourescent lighting have been more or less localized applications in which the lamp has been located fairly close to the work and intended to illuminate a definite and limited area.

Because of a peculiar architectural problem, however, flourescent lighting was suggested for general illumination in the new quarters of the Security National Bank, of Greensboro, N. C. This area was originally designed for bank occupancy and featured the massive proportions which were long felt to be a part of banking architecture. In order to obtain more working space, C. C. Hartmann, architect for the bank, decided to depart from tradition and to divide the original lobby with its 23 foot ceiling into two floors. This resulted in a main lobby having a distance of only 11 feet from the floor to the bottom of the beams supporting the new story. The lighting problem, already complicated by the low ceiling and exposed beams, was made even more difficult by the necessity of running the air conditioning ducts exposed.

The lighting service department of the Duke Power Company was consulted and the suggestion was made to so arrange the ducts and beams as to form recessed coffers to house the lighting equipment. Consideration was then given to the possibility of using fluorescent lamps and a layout developed. The coffers were made 11 feet long, 6 feet wide and 18 inches deep with eight 40-watt fluorescent Mazda lamps arranged in each coffer in such a manner as to give a uniform distribution of light. To obtain the maximum efficiency, exposed lamps were utilized, but the depth of the coffer served to shield the lamps from normal view. To make this shielding more effective, tellers cages, desks, etc., were arranged to face the short length of the coffers.

Lamps are installed on chrome finish Wiremold fluorescent strip and the coffers are lined with natural color acoustical board to reduce the noise from the auxiliaries to a minimum. Although this finish does not have the best possible reflection factor and might not be adaptable for indirect lighting, it works very well with the exposed lamps. *(Con't on page 59)*

The lighting problem of the recently remodeled Security National Bank, of Greensboro, N. C., was complicated by low ceiling and exposed beams made even more difficult by the necessity of running exposed air conditioning ducts. A design utilizing fluorescent lamps proved most successful.

Understanding and Using the National Electrical Code

By B. Z. Segall

New Orleans Public Service, Inc.
New Orleans, Louisiana

IN this eleventh article of his series on the Code, Mr. Segall continues his discussion of the requirements relating to services, as covered in Article 230. Other articles in this series have appeared in foregoing issues, beginning in April, 1939.

IN the last article of this series, it was pointed out that two functions must be performed by the service equipment. This previous discussion dealt with the disconnecting means which must be provided for the service. In this article, we will discuss the second function, that of providing overcurrent protection in the service equipment for the entire interior wiring system beyond the service.

The general rule for overcurrent protection is important. It simply states that each ungrounded service entrance conductor must be provided with overcurrent protection. This should not be confused with other sections of the code which provide for less overcurrent protection of the circuit wiring. For example, for motor circuits the overcurrent protection may be omitted in one or even two of the ungrounded conductors. Under all conditions each ungrounded conductor of a service entrance system must have overcurrent protection.

The specific protection must be a device which can be installed in series with the line. In general, the rating or the setting of this device must not exceed the carrying capacity of the wire it is protecting. However, five exceptions are recognized by the code to this general rule. (Section 2371a.)

The first exception recognizes the fact that a service may be supplying a motor load or a combination motor and lighting load. The rules for overcurrent protection of motor circuits or combination motor and lighting circuits permit these circuits to be "over-fused," that is, the setting of the circuit breaker or rating of the fuse in the service entrance conductor may be far in excess of the carrying capacity of the service entrance conductor itself. As will be pointed out in the discusion of motor circuits, this is necessary to eliminate excessive fuse blowing or circuit breaker opening due to the high starting current imposed on the circuit by motor loads.

The second exception allows an instantaneous type or time delay thermal trip type of circuit breaker to have a setting 25% higher than the capacity of the service entrance conductor. The breakers if set for full wiring capacity, especially the instantaneous type, would be opened quite frequently whenever the load would be equal to the full capacity of the wire.

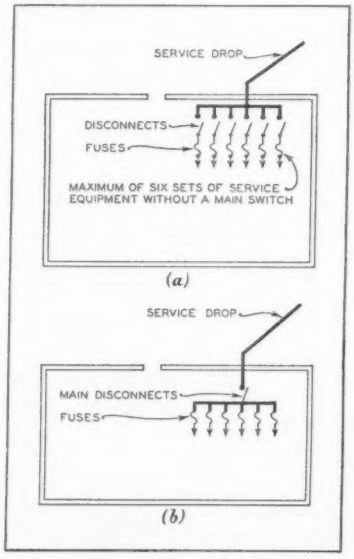


Fig. 25. These diagrams illustrate the rules governing the use of six fuses and disconnects, or less, in lieu of a main switch and overcurrent protective device.

The third exception is but a correlating rule to 2351a which allows a maximum of six circuit breakers to serve as the disconnect means for a service in place of one large disconnecting switch. Similarly, since a circuit breaker is inherently a combined disconnecting device and an overcurrent protection unit, up to six sets of breakers may be installed in place of one main set of overcurrent devices.

The fourth exception is a similar rule for fuses. Since the use of a fuse and switch for service entrance equipment could be accomplished by two separate units, this exception limits the use of six sets of fuses or less for only two methods of arrangement of the switches and fuses. Figures 25a and 25b show these two arrangements. In Figure 25c each fuse has its individual disconnecting switch. In Figure 25b all six fuses, or less, are placed in a common enclosure with a main disconnecting switch.

A recommendation has been sent to the Electrical Committee to combine exceptions 3 and 4 to read: "3. Not more than six circuit breakers or six sets of fuses may serve as the overcurrent protective device."

In sction 2351a, the use of six breakers or switches in lieu of a main disconnect is contingent on having them in a common enclosure or grouped at a readily accessible point. This ruling, therefore, automatically applies to the overcurrent protection and would not have to be repeated in the recommodation as shown in the beginning of this paragraph.

The fifth exception is quite complicated in its intent. Two general conditions are involved:

(1) Where a common readily accessible space is available to all tenants in a multiple occupancy building.

(2) Where no such space is available and tenant has access only to his portion of a multiple occupancy building.

For the first condition, up to six

sets of overcurrent devices may be used in place of one main set of protection units. Figures 26a and 26b illustrate this exception. Figure 26a shows six sets of service entrance conductors tapped to one service drop and installed in the space readily accessible to all tenants at all times.

Even though such a common space is available, it is not necessary to bring all the service equipment into this space. A maximum of six sets of service entrance conductors or six sets of service equipment may be brought into a building without a main switch. Thus, Figure 26b shows three sets of service entrance conductors each having two sets of service equipment serving three customers in a building. It should be noted that a common space is available but each set of service entrance conductors are brought into the individual tenant space. As long as there is but a total of six divisions of the service, such as three sets of service entrance conductors with two sets of service equipment on each, no main switch is required. If the building is further subdivided and another set of service equipment or another set of service entrance conductors installed, then a main switch would have to be installed at "A" as shown by the dotted lines.

For the second condition outlined above, i.e., no common space readily accessible to all tenants in a multiple occupancy building, quite different rules apply. Figure 27 illustrates this exception. It will be noted that there are seven sets of service entrance conductors and no main switch is required as long as all taps are made to the service drop on the outside of the building. It also will be noted that one customer is served through six

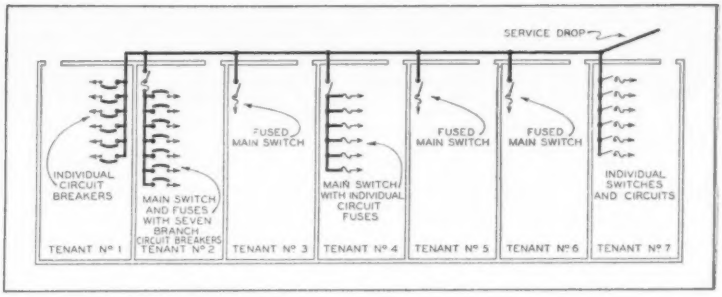


Fig. 27. When no common space readily accessible to all tenants in a multiple occupancy building exists, no main switch is required in the service as long as all taps are made to the service drop on the outside of the building. Such taps are not limited in number. Note that the subdivisions of each tenants service must not exceed six unless a main switch and overcurrent protective device is installed.

sets of circuit breakers instead of a main switch, that another is served through a main switch and six fuses, that a third is served through six sets of switches and fuses, and that the balance are served through fused main switches. All four types of installations are acceptable, provided:

(a) No common space is available, and

(b) All taps are made on the outside of building.

All the general rules for overcurrent protection are stated in Article 240. In section 2409 of this Article, general requirements are set up for overcurrent protection of the grounded conductor. One of these rules states that no overcurrent device shall be placed in the grounded conductor unless this overcurrent device simultaneously opens all the conductors of the circuit. Section 2371b states this rule and augments this requirement by stating that the grounded conductor overcurrent device shall be a circuit breaker. Obviously, this is the only standard device available to perform this function.

The service overcurrent device must in general be an integral part of the service disconnect. However, it may be in a separate unit but then must be installed immediately adjacent to the service disconnect. Quite often the service equipment is located some distance within a building. To protect the exposed conduit and equipment inside of the building, the overcurrent device is quite often required to be installed at the outer end of the service raceway at a point near the junction and the service entrance conductors and the service drop. Under these conditions, the service disconnect and overcurrent device do not have to be set up in one unit or adjacent to each other.

Very often, as outlined in the preceding paragraph, the overcurrent device is not readily accessible so that a second overcurrent device is provided usually as a part of the service disconnect. Again in many cases, the service overcurrent device is sealed within a cabinet and thus is made

(*Continued on page 56*)

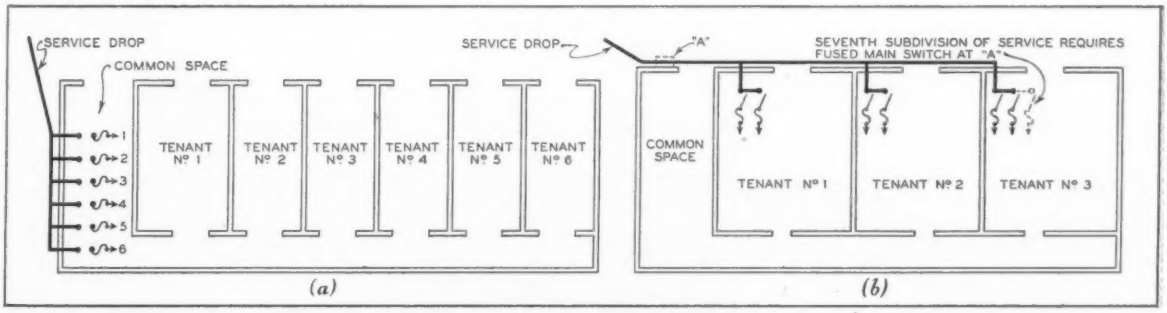


Fig. 26. In (a) above, six subdivisions of a service in lieu of main service equipment have been installed in a building having a common accessible space. A similar installation is shown in (b) except that the six sets of service equipment are installed in the tenant spaces. Note that the addition of a seventh subdivision of the service as indicated in tenant space No. 3 would require the installation of a main switch and overcurrent protective device at "A".

Advertising and Canvassing Find a Place in this Firm's Promotional Activity

LACK of industry and manufacturing in the city of Florence, S. C., and its environs, and the resulting lack of electrical service and inspection business usually afforded by such plants, has prompted the Truette Electric Company, operated by Harry W. Truette, to develop some "go-getting" business methods of his own. Both newspaper advertising and direct solicitation play an important part in Mr. Truette's promotional plans.

While newspaper advertising is directed primarily at the household and domestic wiring market, some lucrative commercial contracts have come in as direct results of this activity. When a large automobile company was launched in Florence some time ago, the promoters were laying plans well in advance of announcing their intentions and seeking estimates. The question of the electrical work came up, and the Truette Company was selected in advance.

Upon being offered the job, Mr. Truette asked why his company was selected, and was told that all the members of the firm had seen his advertisements for a long time, and that his name was the first to come to their minds. Further, they reasoned, a firm that had been able to stay in business and afford consistent advertising must be sound operators, and accordingly the contract for wiring in the Quality Motor Company came to Truette almost unsolicited.

School Paper Brought Results

An interesting variation of the advertising schedule is that Mr. Truette believes in the value of advertising in school papers, which is considered by most advertisers as mere accommodation, or "hand-out." Truette reasons that the more substantial citizens, owners and operators of businesses and homes, will be interested in their childrens' school activities, and will read their school paper; thus he feels that his message therein will be read by the right people, and that further, such citizens will appreciate his firm's support of the young peoples' activity.

His faith in this theory was firmly substantiated by a contract which came in through this advertising. The 15-year-old daughter of a member of the building committee of the Methodist Church in Myrtle Beach overheard her father talking of the plans to build a new church, brought her school paper to him, and said, "Here's a good contractor: he advertises in our paper." The result was that Mr. Truette got the contract for all the wiring of the building, to the tune of over a thousand dollars. This result of the school paper advertising came in from a locality over seventy-five miles away from Florence.

The second spear-head in Mr. Truette's attack is a solicitation program which combines active cultivation of new prospective customers with a free inspection service. The solicitation was originally staged by Mr. Truette to bridge periods between jobs, and was so successful that it has now become a regular part of the firm's promotional activities. Competent electricians are used for solicitation so that no problem which may be encountered in a prospect's plant will necessitate a delay or a check-back.

Harry W. Truette

A list is made of all power users and potential customers in the area, who are not currently giving any business to the firm. The staff then calls on these prospects, offering free inspection and checking of any power machinery, motors, wiring or electrical devices. In this field, emphasis is placed on the commercial and industrial market rather than the household field. At the conclusion of the electrician's inspection, he presents the firm's management with the results of his findings, and returns immediately to the shop with the data he secured.

A quick estimate is made, and a bid is placed in the management's hands at once, some times on the same day. Frequently, jobs result immediately, and if not, they usually come in later. Those who do not break at once are then regarded as active prospects: the firm knows they need the work, it knows the exact nature of it, and how much it will cost. Careful follow up at intervals helps sell the pending jobs.

One of Mr. Truette's employees happened to be in the Cox Motor Company for some car repairs, and while there, offered to check the company's electrical equipment for them. Finding a motor in bad shape, he pointed out the need for repair in it, and the survey finally resulted in a complete rewiring of the plant, with several motor repairs as well.

"By seeking business in the other man's plant, you are in a different position from that when he brings it to you," comments Mr. Truette. "He feels that since you sought the business, your price should be right and final; he won't stand for a change in the first quotation, no matter how legitimate. Consequently, costs must be figured right to the dot, and bids formulated with care."

Example of Truette's bidding habits is found in the county electrification work. Bids were thrown open, and a large number of contractors bid on the some 80 contracts which were open. Truette made a quick survey of the jobs as well as depending on the information issued by the governing board of the electrification project, and landed 43 of the contracts. Installation found him with a good margin of profit in every job, the result of his personal survey of conditions and care in making up his bids.

Diversification Essential to Small-Town Contracting Volume

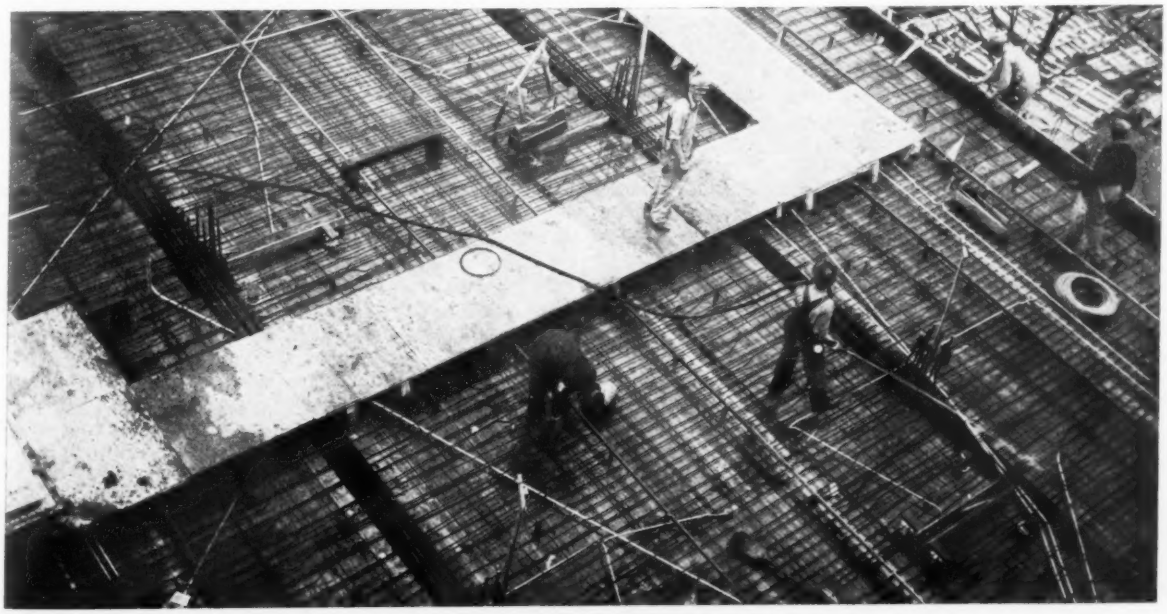
CONTRACTORS in major industrial centers or large cities may build up satisfactory and profitable volumes by specializing and concentrating on certain fields of work. In smaller communities, it behooves the contractor to fill out his volume by securing his share of all types of work, from appliance sales to industrial repair servicing. Electricians in relatively small cities might take several tips from the manner in which the Shaw Electrical Company reaches out into practically every branch of electrical contracting in Greenville, Mississippi, to accumulate a highly profitable and well rounded volume of work.

In seeking business from a variety of markets rather than specializing in one or two, the first requisite, Robert H. Shaw believes, is a carefully organized office routine and promotional system. The hub of this system is an elaborate card file system which Mr. Shaw devised himself. Card indexes are maintained for the following divisions of the business: major contract prospects, repair prospects, and electrical appliance prospects.

Correspondence, papers and plans relating to each prospect are filed together, and the index card shows where each particular file is kept. On the card is noted a summary of the stages of promotion of the prospect, and an automatic "bring-up" system rotates the cards so that they act as a reminder for action on each prospect when such action is timely. This system applies similarly to all prospects, whether contracting services or appliance sales are involved.

Robert H. Shaw

The reference system for completed contracts Mr. Shaw regards as one of his most important facilities. Complete files are created separately on each completed contract, containing records of every step and ramification of the job. These are filed separately, and a card index maintained with the general characteristics of each job on each card. Over a period of time, Mr. Shaw has observed that many jobs will arise which are almost duplicates of some handled in the past, and by reference to those previously handled, shortcuts may be discovered, difficulties avoided, and extra research



Specialization in a single field of electrical work may be highly desirable for contractors in large industrial centers and heavily populated areas, but the small town contractor who wants a well-rounded volume of work must look for it in every possible field: industrial, commercial, residential, advises Robert H. Shaw, successful Greenville, Miss., contractor. His firm handles any type job from repairing a toy electric train to the wiring of a building. Above, his men are to be seen at work on one of their more recent large contracts, the new Hotel Greenville.

and estimating saved.

"Promoting a satisfactory volume of wiring business in a small town requires the application of consumer merchandising principles," relates Mr. Shaw. "One of the most successful efforts my company ever made was when we took a cue from the drug store's 'one-cent' sale. We advertised a special on the installation of new electrical outlets in the home: $2 for one outlet, two outlets for $2.01. We devoted our newspaper space to the offer, and had a deluge of inquiries. The beauty of the promotion was that in every case except one, a considerable amount of additional work was secured in addition to the two outlets; the offer was an entre to a number of homes and the means of making a large number of worthwhile contacts."

Demonstrations Effective

Demonstration is another important adjunct to the selling of Mr. Shaw's services, both in residential and commercial work. When discussing the plans for wiring a new home, Mr. Shaw sits down with the owners, lays out the floor plans on a table, and, with miniature card-board furniture, gets the owners to lay out the room's furniture arrangement exactly as they expect to have it. From this it is easy to locate electrical outlets in the most convenient points and to be sure of installing enough outlets.

The efficacy of demonstration in commercial work has been proved by his use of daylight lamps in selling fluorescent lighting to stores. Mr. Shaw installs the lamps in executives' offices and leaves them there for an adequate trial period; the final sale of the entire installation nearly always results. This method was successful in selling the Nelms & Blum Company, Greenville's leading department store, a complete fluorescent job.

Probably more than any other contractor in the area, Mr. Shaw has cashed in on the opportunities presented in residential wiring by the government-stimulated increase in residential building. This promotion has had stimulus from two factors. Here again, the system of retaining completed contracts came into play, for in open bidding on F.H.A. and W.P.A. projects, the low bid has usually gotten the job, other factors being equal. Accordingly, upon receipt of the plans for a project upon which bids had been invited, Mr. Shaw's reference to completed jobs which paralleled the ones in hand enabled him to foresee opportunities for saving on materials and labor, and to turn in a low bid without sacrificing quality or profit.

The most significant efforts made by the company in rounding up home wiring business, however, have been through inside contacts built up through a rather unusual source. Most electrical contractors play along with the building contractors, and so does Shaw, but in addition, he has staunchly allied himself with the lumber companies of the locality, and many an advance tip comes to him through lumber dealers who have been called in to figure material costs on jobs not yet thrown open for bidding. Advance information and careful bidding has secured the Shaw company lucrative contracts on such projects as the Greenville Nurses' Home, a $2,000 contract, the Hotel Greenville, almost as large, and several profitable service station jobs.

A very satisfactory volume is completed by regular service contracts with local industries. With little or no industrial expansion in the area, industrial work is comprised largely of repair and service work. Mr. Shaw has made it a point to personally discuss the service problems with the significant industries, and to point out to them the benefits of a regular service contract, rather than calling indiscriminately on this or that contractor for each job as it arises. As a consequence, he is called for every wiring or repair need by the Greenville Compress Company, several bottling plants, and others.

Twenty Iron Models in Effective Display

(Continued from page 16)

which can meet almost any objection the customer can think of to offer. In fact, starting at one end of a row of 20 irons the models are arranged in just about the order of objections the average customer makes, beginning with the expensive irons.

"We never try to sell two irons on the first sale," says F. C. Schneider, manager of the sales department, and grandson of the founder of the business. "We know we will get a service job on that iron eventually at which time we can call attention to the need for an extra iron to a customer who can see the point much more clearly since she has experienced the problem of what to do with a dress that is half-ironed. Our large stock of irons is largely due to these extra sales at the service counter.

"Since most of the automatic irons have to be sent to the factory for service, the repair department brings in a large number of customers who must either buy a second iron or borrow one while waiting for the first one to be repaired. To meet this emergency we have reconditioned a number of trade-in irons that we have taken in on a one-dollar allowance. We lend them to the customer while her automatic iron is being repaired. She usually buys this iron for a second iron. Quite often, however, we sell her a new iron."

The Electric Shop does a booming business in cords as a result of the emphasis on service. If the contact points are pitted as a result of cheap cords, the repair man, who always checks this item, calls the customer's attention to it, explaining that a cheap cord may ruin a good iron. A 75-cent or $1 cord is recommended.

So little time is required to repair an iron that a charge of 50 cents is made for labor, plus a charge for materials. It usually takes about 20 minutes to do the job. Most of the jobs need only a new handle. It is a simple, quick operation worth anyone's time, thinks Mr. Schneider, who can repair an iron while he is selling a clock.

To illustrate how service takes care of sales, Mr. Schneider opened up a profitable field by repairing a set of irons for the owner of a hand laundry who later came in for some new irons and told several of his friends about them. This customer now tells Mr. Schneider when his friends in the business are talking about new irons. These prospects are called on at their plants. A sales field has been developed, which although highly critical, usually means the sale of two or more expensive irons at one deal.

"Our formula for selling irons," says Mr. Schneider, "is to have first of all, a large line on display—in our case, 20 models. But in order to have such a display a large reserve stock is needed, and to have such a stock you have to have the sales to turn it—our whole operation depends upon a service department that attracts attention and supplies the sales leads."

Southeastern Electric Exchange Conference In Roanoke

TAXATION, employee and public relations, load building and electric utility operating problems are some of the subjects that will be discussed at the seventh annual conference of the Southeastern Electric Exchange, to be held in Hotel Roanoke, Roanoke, Virginia, May 9, 10 and 11. The Exchange is an association of electric utility operating companies, its membership including thirty companies with operations extending from Virginia to Louisiana.

The program will include a number of prominent industrialists, utility executives, and marketing experts. Among those who will address the conference are: N. M. Argabrite, vice president, American Gas and Electric Co., New York; E. W. Palmer, president, Kingsport Press, Kingsport, Tenn.; C. W. Kellogg, president, Edison Electric Institute, New York; Charles E. Ide, East Tennessee Light and Power Co., Bristol, Tenn., and president of the Exchange; Preston S. Arkwright, president, Georgia Power Co., Atlanta; H. W. Story, vice president and general counsel, Allis Chalmers Mfg. Co., Milwaukee, Wis.; Elmer Roper, distribution consultant, New York. Harold E. Meade, vice president, New Orleans Public Service, Inc.; Charles E. Swartzbaugh, president of National Electrical Manufacturers Association, and Swartzbaugh Mfg. Co., Toledo, Ohio; and others.

A special feature of the Thursday evening session will be an address and demonstration on modern lighting presented by Freeman Barnes, incandescent lamp department, General Electric Co., Nela Park, Ohio. The annual banquet and dance is scheduled for Friday evening, with a widely known utility executive as guest speaker.

Activity reports of the various sections of the Exchange for the past year will be presented during the conference. Section chairmen include: sales section, R. B. Roberts, Florida Power and Light Co., Miami; engineering and operation section, R. I. Butterworth, East Tennessee Light and Power Co., Bristol; accounting section, H. W. Boozer, Georgia Power Co., Atlanta; and employee activities committee, W. A. Moore, Mississippi Power and Light Co., Jackson.

Business sessions of the conference will be held on Thursday, Friday and Saturday mornings, leaving afternoons open for golf and other recreational activities. Among the numerous facilities offered by Hotel Roanoke are non-resident guest cards at the Roanoke Country Club, the Monterey Golf Club, and the Blue Hills Golf Club. A delightful swimming pool is available at the Country Club, and excellent riding horses with privileges of 25 miles of trail may be obtained from the Blue Ridge Hunt Club.

An interesting entertainment program has been prepared by the local entertainment committee, headed by W. I. Whitefield, of Appalachian Electric Power Co. For the ladies, a program of luncheons, bridge, and sight seeing trips has been planned.

Charles E. Ide, president of the Exchange, will preside over the conference. Other officers include: first vice president, A. W. Higgins, president, Florida Power Corp., St. Petersburg; second vice president, L. P. Sweatt, vice president and general manager Mississippi Power Co., Gulfport; and third vice president, C. C. Curtis, president, Savannah Electric and Power Co., Savannah.

The sincere hospitality of an old English inn, combined with the conveniences, comfort and service of a modern metropolitan hotel, are offered by the new Hotel Roanoke, headquarters for the Seventh Annual Conference of the Southeastern Electric Exchange. Views of the Hotel and typical scenic beauty of the vicinity are shown here. Business sessions of the Conference are scheduled for May 9, 10 and 11. (Photos courtesy Norfolk & Western Railway.)

Oklahoma Association Holds 22nd Annual Convention

C. W. KELLOGG, president, Edison Electric Institute, and R. M. Winsborough, Middle West Service Co., were among the speakers, prominent in the electrical industry, who appeared before the Oklahoma Utilities Association during its 22nd annual convention.

The convention, held March 18-19 at the Biltmore Hotel, Oklahoma City, Okla., was attended by about 400 delegates, most of them executives and employees of electric and natural gas utilities. Speakers confined themselves principally to the more serious general problems, many of which affect both classes of public utilities represented in the meeting. The speaking program was about evenly divided between representatives of electric and gas companies, with a few speakers from outside the industries.

Explaining modern methods of advertising, especially as applied to the electrical industry, which he believed would be helpful to other utilities, Mr. Winsborough advised his hearers to anticipate their problems before they arise and then endeavor to head them off with sustained and carefully planned advertising and other methods of improving public relations. "We have to discover the fires and put them out before they spread," he said.

Mr. Winsborough explained that the two principal objectives of utility advertising are to cause the public to think well of the industry and to secure wider use of utility service, so that the business may grow and its customers get more for their money.

Many interesting results of surveys made by his company in about 14 states, some confined to single communities and others more general, were outlined by Mr. Winsborough. A poll taken among customers of a single electric utility and relating to the same rates showed that 57.6 per cent of those queried, who were antagonistic to utilities, thought light rates were too high. Among people friendly to the company 34.6 per cent thought rates were too high and 63.1 per cent thought them to be fair and reasonable.

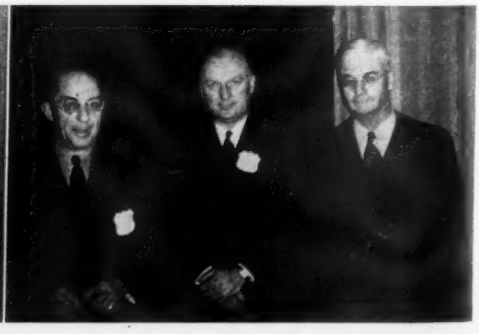
The fact that one survey indicated that nine out of ten people were able to name a government dam project shows that the government has done a good job of selling its program, the speaker asserted. This was cited as a reason why utilities should do a better selling job to the public. On the other side of the balance sheet, however, favorable to the utilities, only 16 per cent of those answering another poll believed that service would be better under public management.

"A popular misconception is that an electric transmission line is a source of energy in and of itself," declared C. W. Kellogg, president, Edison Electric Institute, New York City, in a paper dealing with "Interconnection." Such a line is a dead drag, the speaker explained, unless it makes the use of some generating capacity more effective. The value of an interconnection depends on the net saving after deducting the burden of transmission.

The speaker explained various forms of interconnection intended to affect savings in transmission. He referred to the English grid system which some have said could be applied economically in the United States. These should bear in mind that the English grid system is designed to meet a great diversity of loads encountered there. Before advocating such a system for the United States one should consider the vastly different conditions existing in this country, he recommended.

At the close of Mr. Kellogg's address, R. K. Lane, president of

(*Continued on page 30*)



Upper left, Frank B. Long, president, Oklahoma Utilities Association, who presided over the two-day convention in Oklahoma City. Below, left to right, J. F. Owens, president, Oklahoma Gas and Electric Co., and C. W. Kellogg, president, Edison Electric Institute, New York. R. K. Lane, president, Public Service Co. of Oklahoma, first vice president of the Association, and J. C. Happenny, president, Oklahoma Power and Water Co., Sand Springs, who was elected chairman of the Association's light and power division. George A. Davis and Glenn Kiley, both of Oklahoma Gas and Electric Co., and S. I. McElhose, Southwestern Light and Power Co., all directors of the Association.

"Blame It on Love"

ENTHUSIASTIC reception by appliance dealers and distributors is being accorded Hotpoint's full length feature motion picture, "Blame It On Love." The picture will be shown under the auspices of local retailers and utilities selling Hotpoint Home Appliances. It will provide a splendid opportunity to present the complete "use value" story on home appliances to large groups in a dramatic, appealing manner.

The hour-length picture sets a high standard in the field of commercial motion pictures. Produced in the Hal Roach Studios in Hollywood, "Blame It On Love" has a full cast of well-known Hollywood players. According to motion picture authorities, a cast of this high caliber has never before been assembled in a commercial picture. Every foot of the picture is packed with the same emotional appeal that causes millions to stand in line every day at motion picture theaters all over the country. The "commercials" are handled in an extremely clever manner and cannot fail but arouse enthusiasm for the Hotpoint products.

An exploitation book, containing detailed suggestions for using the picture to greatest advantage, will soon be made available to dealers by the Hotpoint company. A series of "trailer shorts," each presenting an expert demonstration of home appliances are also to be made available for showing in combination with the feature motion picture.

"Blame It On Love" is the story of Terry Arden (Joan Marsh), beautiful featured singer with a swing band on a popular local radio station. She and Jeff Wadsworth (John King), son of one of the city's leading wealthy families, are deeply in love. Jeff's mother is bitterly opposed to her son marrying a "swing" singer, but the two youngsters elope anyway. Terry tries hard to make a real home out of their apartment but it is soon evident that she's about the world's worst housekeeper.

Terry is embarrassed and unhappy at her obvious housekeeping imperfections, and worried at Jeff's preoccupation with his invention—a radio-controlled airplane—with which he hopes to make a fortune for the two of them. On the other hand, Jeff is discouraged at his failure to secure financial backing for the airplane idea. A particularly trying day begins with a breakfast that's worse than usual, followed by another turn-down for Jeff—this time from his own father and the board of directors. Jeff, goaded by his own disappointment, unwittingly taunts Terry about her failure as a cook. The resulting quarrel brings the picture to a splendid dramatic climax. Terry leaves, and it would seem that their romance is dead—from lack of nourishment.

She finds a spot as singer on a new radio program—"The Modern Home of the Air," featuring the Hotpoint Electric Kitchen — a coast-to-coast broadcast, with television hook-up.

Here she meets Virginia Francis —the home economist who conducts "The Modern Home of the Air." Virginia soon notices Terry's lack of housekeeping ability, and offers to help her. Big feature of "The Modern Home of the Air" program is an electric cooking school, featuring Hotpoint Measured Heat. The entire cooking school is shown in the picture —at the point where Terry determines to become a homemaker.

Because of the simplicity and convenience of the Hotpoint electric range and refrigerator, it isn't long before Terry is turning out meals fit for a king. Of course, she loses no time in having Hotpoint equipment installed in her

These scenes are from Hotpoint's feature moving picture "Blame It on Love," a romantic, fast moving story designed to present the "use value" story on home appliances to large groups in a dramatic, appealing manner. Previews of the picture have been received with enthusiasm by Hotpoint dealers and distributors throughout the country.

own kitchen. Seemingly overnight, she is transformed into a perfect homemaker.

Jeff keeps track of Terry's progress, via radio and television. When he asks to see her, she invites him and his family to dinner at her home. Even though Terry has been at the radio studio nearly all day, her dinner is a triumph. With a new conception of Terry as a homemaker, Jeff's family withdraw their objections, while Terry and Jeff—their troubles over—embark on a new and happier life.

Oklahoma Association's 22nd Annual Convention

(*Continued from page 28*)

the Public Service Company of Oklahoma, Tulsa, and first vice president, Oklahoma Utilities Association, outlined the interconnection system of principal electric utilities of Oklahoma connected with transmission lines in adjoining states. He said that this system had been well developed and is very effective in securing greater economy and efficiency in transmission in Oklahoma.

A talk on, "The District Manager and the Public," by P. V. Root, Oklahoma Natural Gas Company, Muskogee, Okla., was mutually helpful to electric and gas utility managers and employees.

"Smile darn you smile," would be a good slogan for every district Mr. Root declared. "A smile breaks down the defense mechanism of the public as nothing else will," he said. In his opinion, a public utility manager should take a small part in several civic organizations instead of playing a large roll in a single one. If he accepts the leading place, the public is likely to say that his company has contributed the most money or has selfish motives. He should keep well informed on local political moves but not take sides in them.

"In no other business do wives play such an important part as in the public utility business," Mr. Root declared. Gossip is a pitfall this wife should avoid. She should be democratic in all her social and personal relations, as many of her friends and acquaintances are customers of the district or local manager.

An address on the "Cost of Government," by T. M. Markley, attorney, Public Service Company of Oklahoma, Tulsa, was intended principally to show the spread of the people's tax money rather than a criticism of government, the speaker explained. He enumerated scores of federal alphabet agencies, forty of which have been created since 1930. He also declared that the total of the public debt, direct and indirect, has reached 45 billion dollars. "The idea that we can ultimately carry a federal debt of 80 billion dollars seems a bit fantastic when we spend approximately 20 billions of dollars annually on government." Mr. Markley attributed this condition principally to the American inclination to "Let George do it"! As a result of this policy, "George" usually is a professional politician. This is not intended as a criticism of government, the speaker said, because "we have sat by and let these things develop." The government officials, as a rule, are doing as good a job as they know how but the average citizen should take a more active interest if present high cost of government, federal and local, with resultant high taxes, is to be lowered.

Frank B. Long, vice president, Oklahoma Natural Gas Company, Tulsa, elected president of the Oklahoma Utilities Association at a meeting of the executive board in January, presided over sessions of the convention. In his brief address, opening the meeting, he warned: "As representatives of gas and electric utilities, don't forget that you do not have a monopoly. We still have coal, petroleum, wood and candles in Oklahoma."

Utility managers and employees are the stewards of the people's money, he asserted. These people have invested, in Oklahoma, in 3500 miles of electric transmission lines; thirty-five generating stations and many other electric properties. They also have invested in 3600 miles of gas transmission lines with capacity of 50 billion cubic feet annually. The Association president pointed out that a total of more than a quarter of a billion dollars have been invested in the gas and electric industries in Oklahoma and these companies are equipped to carry even greater loads than at present.

Elmer Schmidt, vice president, Lone Star Gas Company, Dallas, also chairman, Natural Gas Section, American Gas Association, delivered a message of vital interest to the gas companies. It emphasized the stability of the general utility industry in weathering depression years and later using capital at low interest rates to make improvements.

Robert D. Garver, counsel, The Gas Service Company, Kansas City, Mo., talked on the operation, thus far, of the natural gas act of Congress and interstate commerce commission valuations of oil pipe lines made under it, which set aside some established rules of valuation.

The public utilities were complimented for their excellent service and their progress in securing public approval in Oklahoma by Dave Vandivier, Chickasha, president, Oklahoma Press Association. He emphasized the value of carrying their messages to the public, through regular advertising.

Other speakers included: W. H. Carson, dean, college of engineering, University of Oklahoma, Norman, who explained the Southwestern Gas Measurement Shortcourse, sponsored by the university, the Oklahoma Utilities Association and others; E. W. Smartt, Oklahoma city, chairman state board of public affairs, who talked on the industrial development program for Oklahoma, and Dr. Howard Taylor, Chickasha, Okla., who delivered an inspirational and humorous address at the annual convention dinner on the subject, "Why Go Crazy?" R. K. Lane, Tulsa, was toastmaster at the dinner.

Miss Kate A. Niblack, association secretary, announced that the electric and gas divisions will both hold fall meetings.

The electric division chose as its new chairman J. C. Happenny, president, Oklahoma Power and Water Company, Sand Springs, Okla., to succeed R. K. Lane. The gas division selected A. F. Potter, general manager, Bartlesville Gas Company, Bartlesville, Okla., as its chairman, succeeding W. L. Woodward, president, Zenith Gas System, Inc., Alva, Okla. Other officers of the association for 1940 were elected at a directors' meeting in January.

Oklahoma Dealer Places Record Refrigerator Order

The Oklahoma Tire and Supply Company held previews of their 1940 line of Leonard electric refrigerators for their customers in various Oklahoma towns in February. The company, with headquarters in Tulsa, Oklahoma, and operating throughout the Southwest, received 12 carloads of the new models for the introduction. This order is said to be the largest ever shipped by Nash-Kelvinator.

APPLIANCE Service

New Service Opportunities Seen in Locker Plants

By Allen Parker

YOU and I know that if we are to continue in the electrical service business and continue to expand, it is most essential to keep our eyes open for every service job or refrigeration application. Just about the time we think we have found all the new fields, something else turns up, such as refrigeration for air conditioning, for bakery rise, for bottling plant use, and the developing of X-ray and other films.

One of the newest applications of refrigeration, and one that appears to have widespread application, is that of the frozen food locker plant. At present this appears to be an almost unlimited refrigeration field, although the idea originally was stumbled upon by the operator of an ice plant in the Northwestern part of the United States who found that this storage accommodation for his friends and neighbors could be made into a deluxe service and a profitable business.

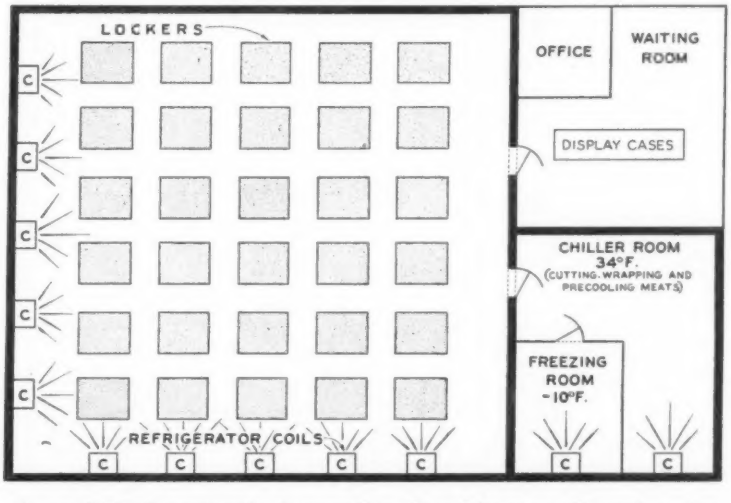
The reason for the outgrowth of this field is simple enough. As an example, picture a farmer who decides to slaughter a beef or pork. He realizes at the start that his family can consume only a small amount of it before he loses the balance, and he also realizes that should he sell the animal to a slaughtering house and then buy it back as he needs it, the cost to get it back will be twice as much as he received for it, which would make it almost prohibitive to eat the meat that he and his own neighbors had raised.

What a different story, though, for him to be able to kill his animals as he chooses and place them in his individual refrigerated locker where the meat will be preserved almost indefinitely in a good condition and allow him to choose the amounts and parts as he likes; all for only a small charge for the service. And so, it's no wonder that this idea immediately grew popular in the Northwest and that the construction of these plants is rapidly spreading to other parts of the country.

A few such locker plants are now in operation in the South with several more in the making or under construction. Of course, your first thought might be that the majority of these locker plants will be installed in connection with the ice and storage plants already in operation and, frankly, these plants may be turning down a wonderful opportunity if they fail to see the possibilities of a locker plant in conjunction with their present cold storage and ice business. However, the fact is that they are absolutely dependent upon their rural support for their existence, hence they are being located in the small towns and villages, many of which do not have a local ice or cold storage plant.

Don't assume that the size of the equipment is getting away from that commonly serviced by the average service engineer. Undoubtedly, the three and five horsepower jobs will be very popular with the smaller locker plants which are sure to precede the larger plants. And with the smaller plants placed in strategic locations the larger ones may never come into existence. Remember that a small plant would operate between 200 and 250 lockers and that it is possible to do this with only about a three-horsepower job and hold the temperature at about five degrees. Naturally this would have to be a well insulated job. As might be expected most of these plants will operate with at

(*Continued on page 60*)



A new field of opportunity is opened to the refrigerator sales and service firms in the cold storage locker rooms that are springing up throughout the rural territory. Many of them are being built through government loans and are owned by rural cooperative organizations. A typical plant layout is illustrated here. Freshly killed meat is first delivered to the chiller room, where it is cut, wrapped and precooled. In the freezing room, the wrapped meat is quickly frozen and ready for storage in the individual lockers in the locker room, maintained at a temperature of from 5 to 10 degrees F. Jobs are not as large as one might think: a 200 locker plant requiring only about three horsepower to maintain a temperature of about 5 degrees, assuming efficient insulation.

MOTOR Service

Connecting Diagrams for Lap Wound A-c Motors

Part 10

By A. C. Roe

Railway Motor Engineer
Westinghouse Electric & Mfg. Co.

WITH this article we present the first of the eight-pole series of connecting diagrams, Figs. 28, 29 and 30. Fig. 28 is the 8-pole, 2-phase, series connection with four leads, but by bringing out eight leads it can be used to connect a motor for dual voltage by external reconnection. Fig. 29 is the series star, and Fig. 30 the series delta, 3-phase, 8-pole diagrams, both of which can be arranged with three or nine leads, for single or dual voltage connection.

This month, we will complete the discussion started last month on the methods of bringing out leads on stator coils. This discussion will include the methods where the leads are bent down, instead of straight out. Both free leads and leads tied to the coil will be covered.

These last two methods are based on the leads being bent down or away from the air gap. In order to understand the reason for using the term "leads bent down," the reader must refer to the explanation given last month defining the meaning of the "top cell" and "top coil half." However, it is readily seen that if the leads are bent away from the air gap it would be from the top of the coil towards the bottom coil half, as shown in Figs. I and J.

Fig. I-a illustrates the method designated as "leads bent down and the bottom lead free." This is comparable with Fig. G of last month except the leads are on the bottom section of the coil ends. In Figs. I-a and I-b, the top lead is brought out as wound, and it is caught under the finishing tape half-way down the nose of the coil. Thus the top leads are clear of the air gap section.

The bottom leads present more of a problem with bent down leads than they do with straight out leads, in that the leads must be kept in the space between the diamond point or clear of the winding angle between adjacent coil ends. For this reason, the strands in the bottom lead conductors are arranged to restrict the dimension "J," Fig. I-b, to the smallest amount possible. It will be noticed in Figs. I-a and I-b that the conductor has two strands, two wide by one deep, but in bringing down the bottom lead the two strands are bent on edge.

The letters in Figs. I and J for the lead lengths, and for indicating where the lead insulation ends, are the same as used in last month's article, but in this case the basic point from which measurements are made is at the bottom of the coil diamond point.

The fourth method of bringing out leads, or "leads bent down and with the bottom lead fastened to the nose of the coil," is shown in Fig. J which is similar to Fig. I-a except that the starting or bottom lead is fastened to the coil, as it crosses down, with the finishing tape.

To make the "on-edge" bend in the bottom leads as shown in Fig. I-b, first bend the wire up at right angles on the flat as shown in Fig. K-a, then hold the section that is to remain in the coil flat and bend the free part down on the edge, as shown Figs. K-b and K-c.

The first method described last month, or leads straight out and bottom lead free, is the one most commonly used for low voltage work at voltages of 110, 220, 440 or 550, or where the end room between the coil ends and end bells is ample. For higher voltages, the bottom leads are tied in, for where a rigid winding is required, the fastening of the bottom lead to the coil provides a more secure lead. (*Continued on page 60*)

FIG. L

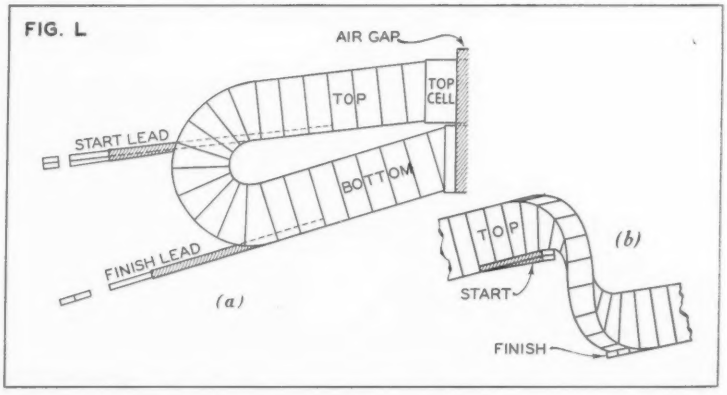


Fig. L. The four methods of bringing out leads shown in Figs. G, H, I, and J, are based on pulling the coils with the coil leads on the bottom. Some winders prefer to pull the coils with the leads on the top. When this is done, the lead location on the stator winding is the reverse of that shown in the previous diagrams. Instead, the finished lead would be brought out from the bottom of the bottom coil half, and the starting lead would then be brought out from the bottom of the top coil half as shown in (a) and (b) above.

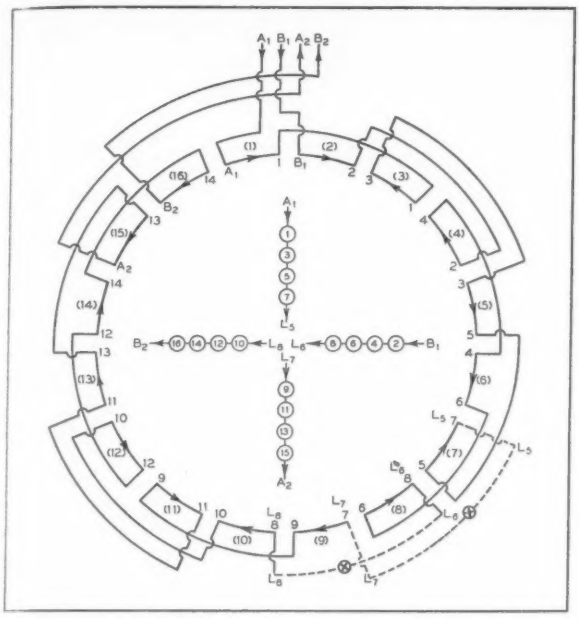


Fig. 28. Diagram for 8-pole, 2-phase with 4 or 8 leads for series or parallel connection. For 8 leads bring out A_1, A_2, L_5, and L_7 for A-phase; and B_1, B_2, L_6, and L_8 for B-phase. For series connection, connect A_1 and A_2 to A-phase lines; connect B_1 and B_2 to B-phase lines; connect L_5 and L_7 together; and connect L_6 and L_8 together. For parallel connection, connect A_1 and L_7 to A_1 line; connect A_2 and L_5 to A_2 line; connect B_1 and L_8 to B_1 line; and connect B_2 and L_6 to B_2 line. Cross in circle indicates point at which windings are opened for dual voltage.

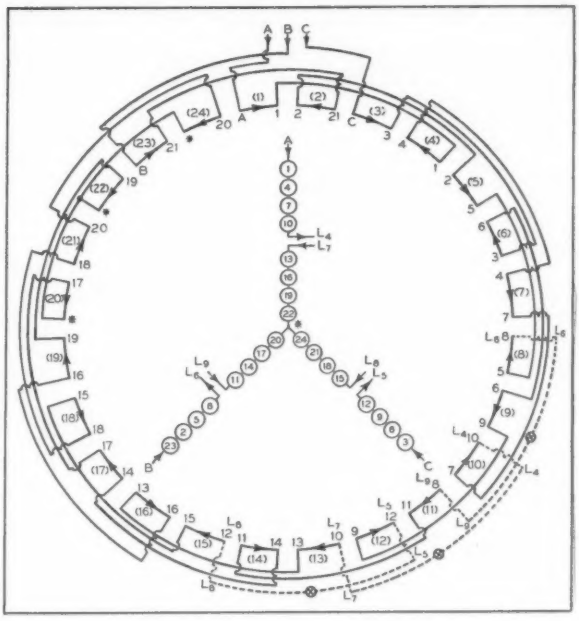
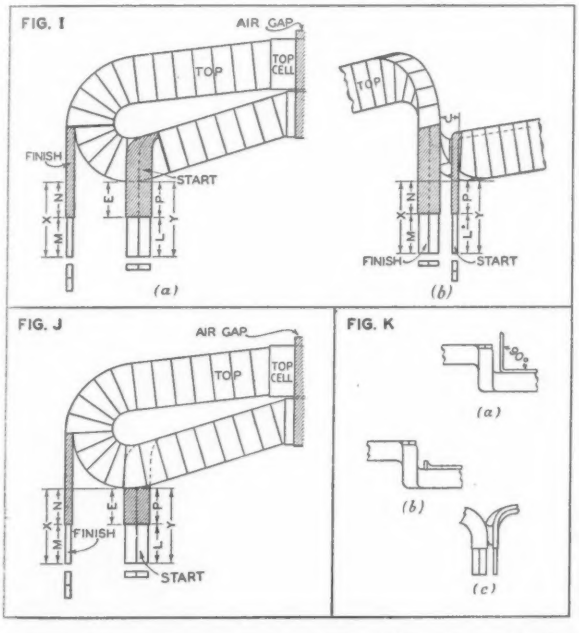


Fig. 29. Diagram for 8-pole, 3-phase with 3 or 9 leads for series or parallel star connection. Bring out 9 leads: A, L_4, and L_7 for A-phase; B, L_6, and L_9 for B-phase; and C, L_5, and L_8 for C-phase. For series star connection, connect A, B, and C to lines; connect L_4 to L_7; connect L_5 to L_8; and connect L_6 to L_9. For parallel star connection, connect A and L_7 to A-line; connect C and L_8 to C-line; connect B and L_9 to B-Line; and connect L_4, L_5, and L_6 together. Cross in circle indicates point at which windings are opened for dual voltage connection.



These diagrams illustrate two methods of bringing out leads in preformed and insulated coils. Fig. I. Both leads bent down (or away from air gap) and starting lead free. Fig. J. Both leads bent down but starting lead fastened to nose of coil. Fig. K. Three steps in the making of the "on-edge" bend in the bottom leads are shown here. First, bend the wire up at right angles on the flat as shown in (a). Then, hold the section that is to remain in the coil flat and bend the free part down on the edge as shown in (b) and (c).

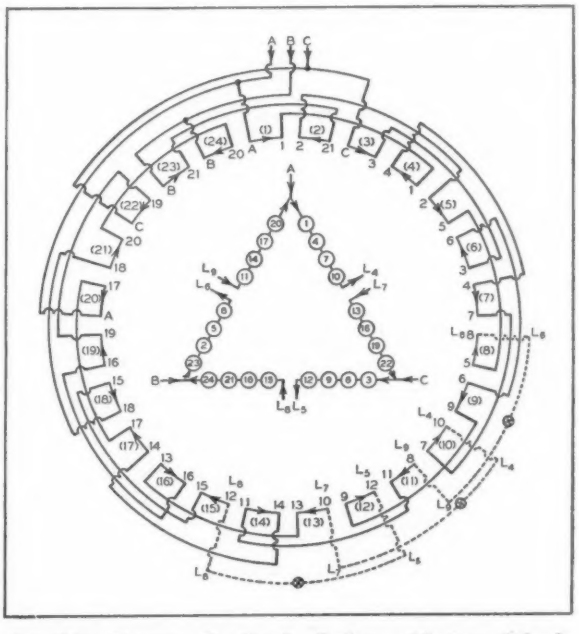


Fig. 30. Diagram for 8-pole, 3-phase with 3 or 9 leads for series or parallel delta connection. Bring out 9 leads: A, L_4, and L_7 for A-phase; C, L_5, and L_8 for C-phase; and B, L_6, and L_9 for B-phase. For series delta connection, connect A, B, and C to lines; connect L_4 and L_7 together; connect L_5 and L_8 together; and connect L_6 and L_9 together. For parallel delta connection, connect A, L_6, and L_7 to A-line; connect C, L_4, and L_8 to C-line; and connect B, L_5, and L_9 to B-line. Cross in circle indicates point at which windings are opened for dual voltage connection.

ENGINEERING SECTION

Utilization of X-ray machine for testing soundness of line pole at the ground line.

"NEXT PATIENT, PLEASE"

By M. L. Ernst
Overhead Lines Department
Detroit Edison Co.

THIS is the story of wooden patients, technicians in overalls, and X-rays taken in a 7,500 square mile examination room. Fantastic? Not at all, for that is just what is going on in Detroit Edison territory today, only the "patients" are the Company's line poles, the "technicians" are line employes, and the "examination room" is the part of Southeastern Michigan that we serve. This is an experiment in improved line maintenance: the use of X-ray equipment to test wood poles for rotting.

A defective pole may result in a serious interruption of our service, hence pole testing plays an important part in our maintenance program. Every pole in the system is examined periodically to determine whether it is strong enough to continue to bear the load placed on it.

A wood pole supporting wires is treated mathematically as a cantilever beam, with the wind pressure against the wires at the top of the pole being the applied force. To counteract this force, the pole must have a cross-sectional area of good wood and be of such magnitude that the resulting tension in the wood does not exceed the timber's ultimate fiber stress at any point. The maximum stress usually occurs at the ground line, which is also the most vulnerable point for decay on a pole. Here is where tests usually are made. This is ordinarily done by tapping, probing and boring, and has resulted in poles being replaced at the rate of approximately 9,000 per year.

In cooperation with the Engineering Division, the Overhead Lines Department has developed an experimental pole testing method using a portable X-ray machine which holds considerable promise. The problem for the pole tester is to be able to distinguish sound from unsound timber, and this is the important part that it is hoped the machine will accomplish.

In actual field practice, the unit is enclosed in a cabinet mounted on a small truck. The X-ray generator, which includes the transformer and tube, is removed and placed on a pair of calipers specially designed for this purpose. After the earth is removed from around the pole, the calipers are placed so that the pole stands between the legs and the X-rays are aimed approximately 30 degrees downward. The film is attached in back of the pole to each end of a caliper leg, and a seven-inch section just below the ground line is X-rayed (as in the picture).

A rubber blanket is used around the pole in order to outline the outer pole surfaces more clearly and thus make diagnostic work less difficult. Included with the X-ray equipment is a control box with an automatic timing device which controls the exposure to definite time limits as determined by the diameter of the pole and its density. A portable 50 cycle a-c gasoline driven motor generator supplies the power for operating the machine.

The radiographs (X-ray pictures) are identified by the use of lead numbers which are placed in front of the film for this purpose. After the pictures have been developed they are placed on an illuminated viewing box screen, and the total area of sound wood is determined. The strength of the pole is found by use of a chart, and this value is then compared with the required strength for the par-

ticular load that the pole in question carries. In this manner we are able to obtain a true picture of pole conditions, and this can be filed away for future reference. Thus a considerable portion of the work may be done in the office whenever convenient.

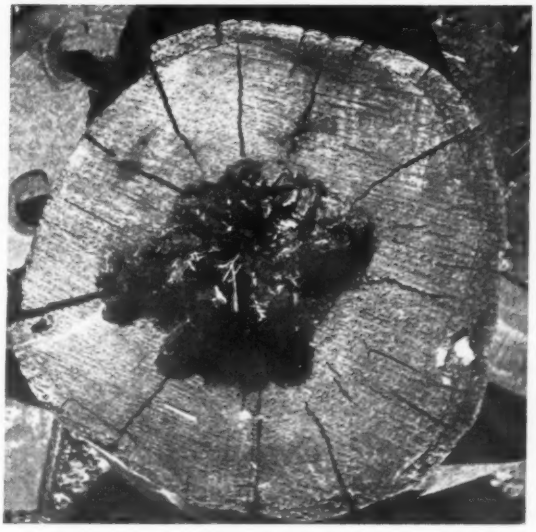
Factors Involved

Many factors must be considered in the use of X-ray photographs. It is the peculiar penetrating quality of X-rays that enables us to determine the internal condition of a non-transparent body such as a pole. This is done by intercepting the rays on an X-ray film or fluorescent screen after penetrating the subject under study. The contrasting light and dark spots on the exposed film depend upon the absorption of the rays by the object being studied, as well as the density of the rays. Density, in turn, is controlled by voltage, current, and exposure time. The absorption naturally varies with the thickness of the object and the density of the material. This variation makes it possible to determine the strength of a pole by distinguishing between sound and unsound wood.

Samples of exposed film showing good and bad wood are shown on this page.

On sound wood the annular growth rings appear as a series of parallel lines when the X-rays are projected at right angles to the pole axis. The difference in density between wood formed during the summer months and that formed in the winter is readily recorded on the film or radiograph. This then forms one clue in determining the strength of the pole, as the formation of the parallel lines on the radiograph gives a positive check that the wood has not disintegrated.

Large volumes of unsound wood may be detected by contrasting light or dark spots with reference to sound wood identified by the annular rings. In some cases this is particularly difficult as the pole diameter may be so great that the rays are almost completely absorbed, with no contrasting shadows appearing on the film. On sound poles this lack of penetration is a graduated process, and the condition of the timber may be determined by noting whether the X-ray penetration fades out gradually or ceases abruptly. Rotten wood may contain so much moisture that little or no X-ray penetration occurs.

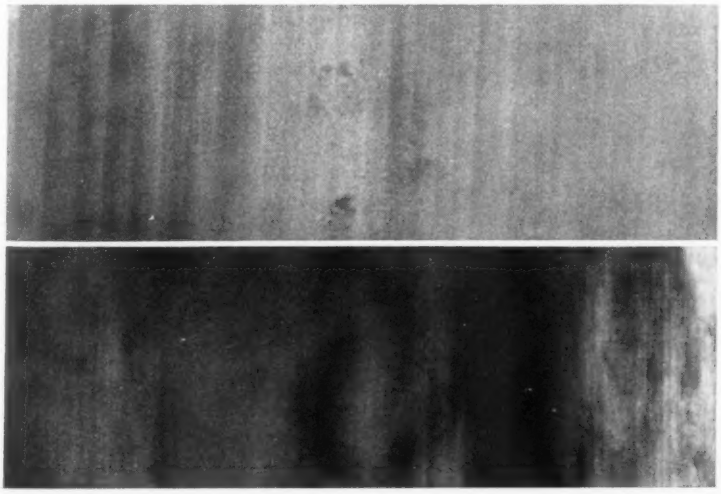


Wood poles containing heart rot, such as shown in this cross section, are a distinct hazard to service. While most companies inspect and test poles at regular intervals, the experimental use of X-ray for this purpose appears to hold considerable promise.

Advantages of X-ray

In pole testing, numerous advantages are gained through the X-ray method. It probably will permit us to make more accurate studies of the progression of rot in timber, which ultimately will allow us to obtain longer pole life. It also will enable us to extend our pole testing program several months and continue it the year around. At present, with the old method, we are able to do no testing during cold weather, for frozen rotten wood sounds and handles much like sound timber. Although X-raying poles involves somewhat longer time and more expense than our present probing and boring method, it is hoped that economies may be obtained by allowing poles to remain in service longer.

Several other uses for the X-ray are being developed in the Company. Among these are the inspection of condenser-type bushings and inspection of defective Admiralty-metal tubing from high temperature turbine bleeder water heater tubes at Delray Plant. This department also is taking pictures of tube-type lighting arresters, measuring the rate at which tube material is consumed in extinguishing arcs.



These reproductions of actual X-ray negatives give some idea of the results being obtained with this new test method. Upper photo shows X-ray of portion of sound pole. The wide spacing of lines indicates that tree grew quite rapidly. Lower photo shows portion of pole illustrating appearance of rotten wood on X-ray negative.

Industry Adopts Standards for Distribution Transformers

COMPLEXITY in the distribution transformer manufacturing situation brought about the establishment of this Joint Committee of the Edison Electric Institute and National Electrical Manufacturers Association, the NEMA members being named on April 12, and the E.E.I. members on May 13, 1938. In recent years, consumer requirements for specialized design in distribution transformers had been rapidly trending upward. While in 1930 a very large percentage of distribution transformers were selected by catalog number from units of standard design, by 1936 this number was approximately equalled by the purchases of transformers with special requirements, with the trend to specializing still accelerating.

This growing diversification, no doubt, was encouraged extensively by the concentrated movement for farm electrification. With the advent of the so-called farm transformer in 1935, new ideas appeared for simplified and lower cost transformer designs, especially as to mounting arrangements. Requirements multiplied for individual company designs. While diversity of ideas is constructive at the start of a new development, if allowed to exceed a reasonable period of inventiveness, confusion of practices and inefficiency results, and this stage appeared to have been reached.

FIRST step in what may become a most advantageous standardization program for the electrical industry was announced recently when Edison Electric Institute and National Electrical Manufacturers Association approved a report establishing design standards for certain mechanical and electrical features of single-phase, pole-type distribution transformers rated 25 kva and below, at 15 kv and below. It is anticipated, in the report, that the new standardized transformers will be available commercially by July, 1940.

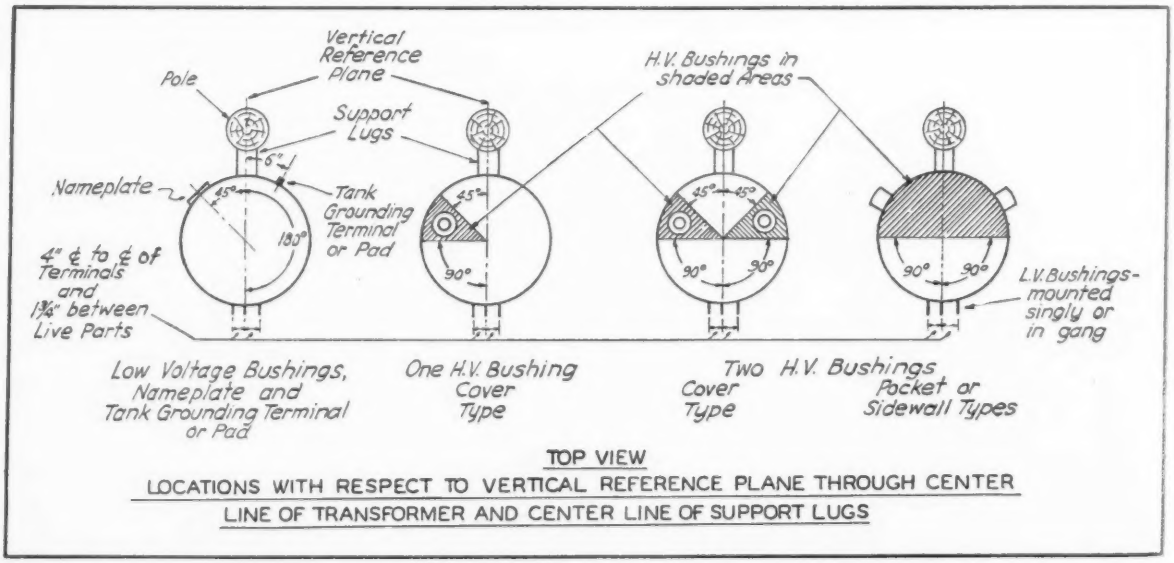
These standards have been developed by an E.E.I.-N.E.M.A. Joint Committee. A. E. Silver is E.E.I. chairman, and J. J. Mullen heads the N.E.M.A. representatives. The accompanying article is excerpted from the Joint Committee's first report.

●

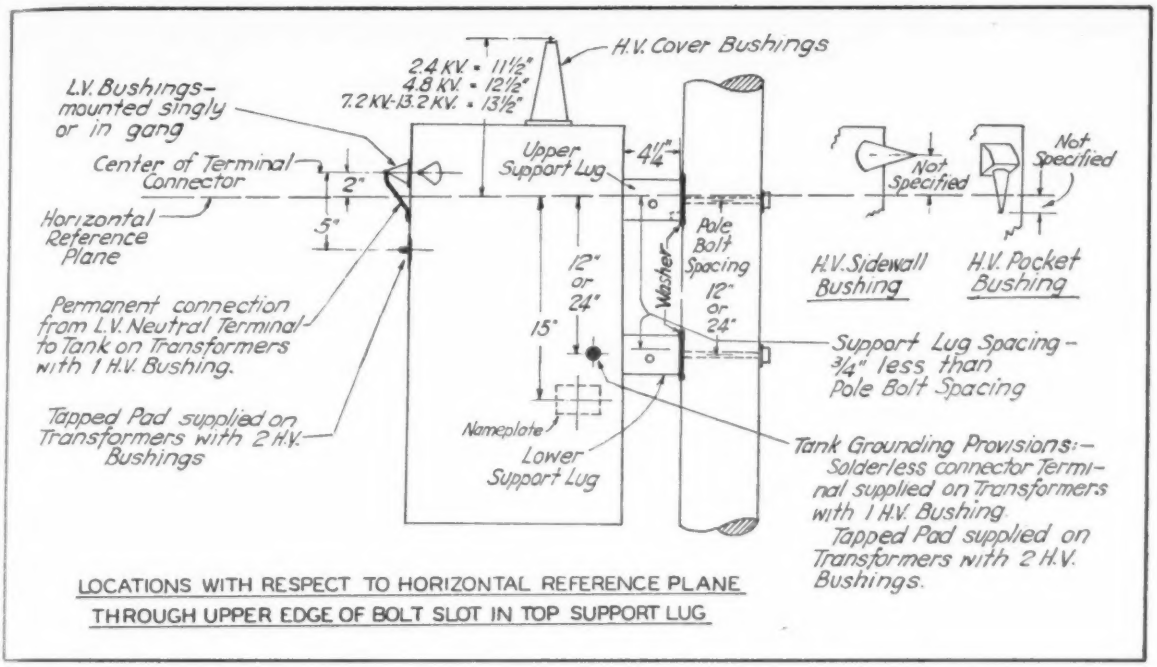
It was with the aim of constructively correcting this situation and working out some reasonable consolidation of transformer design practices in the interest of lower costs to the manufacturers and lower prices to the users, that the Joint Committee was established.

Organization of Work

The Joint Committee interpreted the scope of its assignment to embrace the entire range of single-phase and three-phase transformers, regularly listed by the manufacturers as in the distribution class. However, recognizing that the opportunity lay very largely with pole-type units of small to moderate size, the first step of its undertaking was set to embrace single-phase, pole-type transformers of ratings 15 kv and below, 25 kva and below. Purchases in this group aggregate about 90 per cent, in number of units, of total distri-


Vertical Reference Plane
Pole
Support Lugs
6"
Nameplate
45°
Tank Grounding Terminal or Pad
180°
4" ℄ to ℄ of Terminals and 1⅜" between Live Parts
H.V. Bushings in shaded Areas
45°
90°
L.V. Bushings-mounted singly or in gang
Low Voltage Bushings, Nameplate and Tank Grounding Terminal or Pad
One H.V. Bushing Cover Type
Two H.V. Bushings Cover Type
Pocket or Sidewall Types
TOP VIEW
LOCATIONS WITH RESPECT TO VERTICAL REFERENCE PLANE THROUGH CENTER LINE OF TRANSFORMER AND CENTER LINE OF SUPPORT LUGS

The essential mechanical features of the standards adopted by the Joint Committee are illustrated here and in the diagram on the following page. All dimensions shown on these drawings are preferred ultimate values; the detailed specifications provide tolerances, some of which exceed fabricated needs as an interim allowance for diversity of existing designs. Note especially that both support lugs are to be used with galvanized washer inserted against pole.


H.V. Cover Bushings
2.4 KV. - 11½"
4.8 KV. - 12½"
7.2 KV-13.2 KV. - 13½"
L.V. Bushings—mounted singly or in gang
Center of Terminal Connector
2"
Horizontal Reference Plane
5"
Upper Support Lug
4¼"
Pole Bolt Spacing 12" or 24"
Washer
12" or 24"
15"
Permanent connection from L.V. Neutral Terminal to Tank on Transformers with 1 H.V. Bushing.
Tapped Pad supplied on Transformers with 2 H.V. Bushings
Nameplate
Lower Support Lug
Not Specified
Not Specified
H.V. Sidewall Bushing
H.V. Pocket Bushing
Support Lug Spacing - ¾" less than Pole Bolt Spacing
Tank Grounding Provisions:— Solderless connector Terminal supplied on Transformers with 1 H.V. Bushing
Tapped Pad supplied on Transformers with 2 H.V. Bushings.

LOCATIONS WITH RESPECT TO HORIZONTAL REFERENCE PLANE THROUGH UPPER EDGE OF BOLT SLOT IN TOP SUPPORT LUG

bution transformer purchases.

Two basic objectives were established by the Joint Committee for guiding its deliberations, each aimed at reduction of manufacturing cost through simplification and unification of practice, and reduction of field cost from increased operating convenience. These objectives are:

(1) A basic or standard transformer embodying essential features, with additional equipment available when required.
(2) Interchangeable mounting of all makes, with suitable grouping of sizes.

This procedure contemplates direct benefits to those operating utilities that can use standardized equipment, by savings effected through unification and simplification. At the same time any company now buying specially designed or equipped transformers must still be able to obtain equipment suitable for its needs. However, savings from standardization can apply only in part, or perhaps not at all, where such special equipment is specified.

The Joint Committee next charted the problems and items to be studied in reviewing transformer design practice and needs. It established a procedure for obtaining representative advice from the eleven transformer manufacturing companies in the National Electrical Manufacturers Association, also from the utility group.

At the outset the Joint Committee accepted as basic, current industry standards, including those of A.S.A., A.I.E.E., and NEMA, with the aim of recommending deviations therefrom only as found advisable in specific features studied.

Outstanding Features Studied

All available data, representative of practices and needs, were subjected to careful analysis and formed the basis of the Joint Committee's development studies and findings. These studies were augmented by field demonstrations of improvements and devices proposed by the Joint Committee. A few of the features specifically studied are cited below.

Mounting. Interchangeability of mounting for all makes of transformers called for a thorough study of practices, trends and needs, to insure flexibility for a wide range of conditions, including:

Bolting directly to pole, without crossarm
Bolting directly to pole, coordinated with crossarm
Mounting on crossarm
Using singly, or in banks of two or three
Farm, rural, suburban, and urban construction
A mounting adequately secure from dislodgment by impact
Electrical clearance for safety to workmen.

A mounting design was worked out that, it is believed, will meet all of these conditions, and also be readily adaptable to the trends for further simplification in pole-top arrangement. Support lugs on the transformer tank, suited to bolting direct to the pole, were adapted from the "farm" transformer. Also there was designed an adapter termed "T-crossarm hanger," for crossarm hanging in lieu of the conventional "hanger irons." Specimen tanks with the proposed support lugs were made up and subjected to severe practical demonstrations at Pittsburgh on May 25, at Philadelphia on July 20 and at Pittsburgh on September 8, 1939. These demonstrations were convincing as to mechanical adequacy, convenience and improved appearance.

Taps. For years taps in distribution transformers have been standard for certain voltage ratings, and optional for other voltage ratings—consequently, transformers with taps have predominated.

With some systems, the "NEMA-N.E.L.A., Preferred Voltage" ratios are not suited to established voltage levels; also in certain situations there may be need for changing ratio. Such equipment

(*Continued on page* 61)

ELECTRICAL Books

Heating, Ventilating and Air Conditioning Guide for 1940

Published by the American Soc'ety of Heating and Ventilating Engineers, 51 Madison St., New York, N. Y. Flexible covers, 6 x 9 inches, illustrated, 1184 pages. Price, regular edition, $5.00; special thumb index edition, $5.50.

This publication is an authoritative reference manual for the profession and industry, now in its eighteenth edition, issued annually and devoted exclusively to the subjects of heating, ventilating and air conditioning, and related data on refrigeration. It has been compiled by men active in the profession and the allied industries, and arranged in two sections—a Technical Data Section of 46 chapters and a Catalog Data Section on manufacturers' equipment. It supplies, in one compact volume, engineering data and information on modern equipment, all of which is essential for engineers, architects, contractors and others engaged in the industry.

This new volume is less bulky and lighter in weight than previous editions, due to condensation and consolidation of text matter, and the use of lighter paper. Although there has been addition of much new data in old chapters and one new chapter, the result is a volume actually containing more information, but easier to handle and more convenient to use. A chapter index and a detailed subject index give ready reference to the technical data.

Electric Wiring

By W. S. Ibbetson. Distributed by Chemical Publishing Co., 148 Lafayette St., New York, N. Y. 264 pages, illustrated. Price $2.50.

This comprehensive publication on electric wiring theory and practice was especially prepared for wiremen, engineers and students. Published in Great Britain, it presents an interesting treatment of wiring methods and practices in that country. Despite its relation to British practice, it presents a wealth of fundamental principles and data that should be of interest to electrical engineers and contractors in this country.

Practical Electricity

By Terrell Croft, revised by George H. Hall. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y. 699 pages, profusely illustrated. Price, $3.00.

The electrical industry will welcome the announcement that Terrell Croft's "Practical Electricity," has been brought completely up to date in a fourth edition revised by George H. Hall. Practically no other writer on electrical topics has been able to equal Croft's ability to explain difficult electrical principles through simple language and graphic examples and analogies.

This revised edition includes 54 sections discussing practically every phase of electrical principles and equipment. The opening sections discuss basic ideas and units. Then magnetism, electromagnetism, the magnetic circuits and their uses are discussed. Following these are sections treating of the development of electromotive forces by the different methods, and after this material comes that having to do with the different forms of electromagnetic induction and inductance. This brings the reader to a point where he is in a position to understand direct current generators and motors, and finally comes the sections relating to alternating current and alternating current equipment.

Television—The Electronics of Image Transmission

By V. K. Zworykin and G. A. Morton, both of RCA Manufacturing Company. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. 646 pages, 494 illustrations. Price, $6.00.

Dr. Zworykin and Dr. Morton, both well known in the field of electronics research, present in this publication one of the first comprehensive practical discussions of the fundamental principles of television, written from the engineering viewpoint.

The contents of the book are divided into four parts, the first one dealing with the fundamental physical principles utilized in television equipment. Part two presents the principles of television including such topics as: the fundamentals of picture transmission; the transmission and reproduction of high definition pictures; video pickup devices; and picture reproducing systems. The third part takes up the details of an electronic television system, treating in turn the Iconoscope, Kinescope, electron gun, video amplifiers, scanning and synchronization, and the complete transmitter and receiver. Of particular interest to the practical radio engineer is the fourth part of the book which includes a description of the working system exemplified by the equipment used in the RCA-NBS television project.

While special knowledge in the field of radio engineering is not a prerequisite to an understanding of this text, a familiarity with the elements of circuit theory and engineering mathematics is advisable.

Any of the publications referred to on this page may be ordered directly from ELECTRICAL SOUTH, Grant Building, Atlanta, Ga. All orders must be accompanied by remittances.

Practical Electrical Metering

By M. F. Smalley, A. N. Prentice, H. E. Buck, W. J. Wright, C. L. Lucal, R. V. Kelch, and G. K. Bernhard, all of the Ohio Power Company. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. 228 pages, illustrated. Price $2.75.

Seven engineers of the Ohio Power Company cooperated in the preparation of this book on the fundamentals of electrical metering. The book is based upon lessons from a school conducted by a large operating utility company. The material presented, the authors point out, is not expected to serve as a standard practice in making meter installations, but rather to be consulted as a text-book by metermen and others interested in meters in order that they may better understand the equipment used in their work.

The first few chapters of the book provide a review of the fundamentals of electricity. These are followed by chapters on direct current meters, the induction kilowatt-hour meter, instrument transformers, portable recording instruments, and demand meters.

The plan underlying the presentation of each subject is to present a circuit diagram accompanied by a complete but elementary mathematical and vector analysis in reference to the diagram. Most of the chapters are followed by a group of problems which make this book particularly well adapted to both the individual and group study classes.

Practical Electrical Wiring

By H. P. Richter. Published by McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York. 503 pages, profusely illustrated. Price, $3.00.

A manual of practical electrical wiring for residential, farm and industrial work presented in a form simple enough for the beginner, yet complete enough so that it will be of value to those already engaged in electrical work, was the aim of the author in the preparation of this book.

All methods discussed in the book are strictly in accordance with the 1937 edition of the National Electrical Code. Although it covers its subject in a most complete way, including scores of specific jobs and procedures, the scope of the book is necessarily limited to the wiring of structures of limited size and at ordinary voltages.

The book is divided into three parts, the first one dealing with the fundamentals of electrical work, basic principles, and the theory behind general practices. Part 2 deals with the actual wiring of residential buildings and farms. Part 3 covers the actual wiring of non-residential buildings, such as stores, factories, schools, etc.

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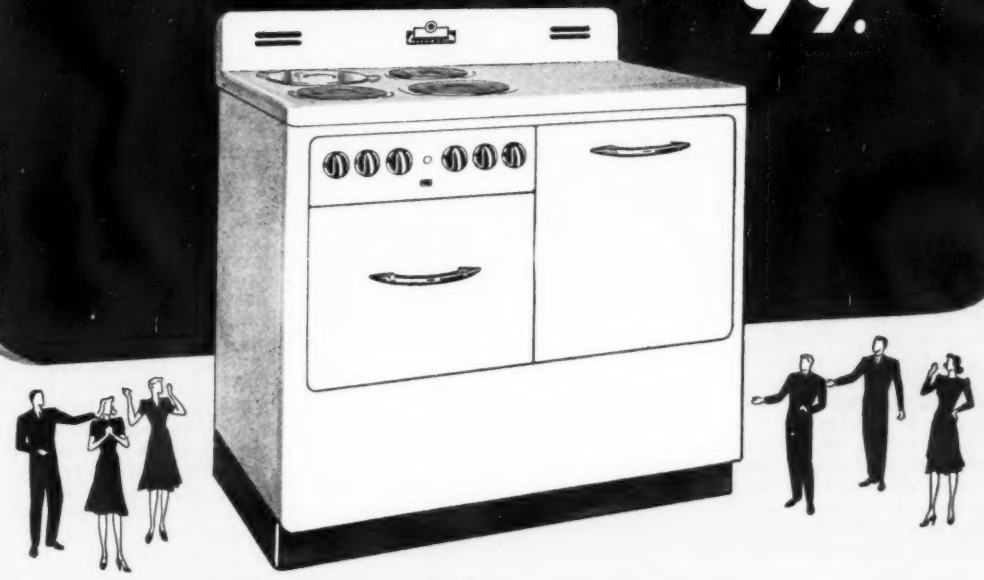

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- ✔ A high-speed broiler, with several positions!
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NEWS of the INDUSTRY

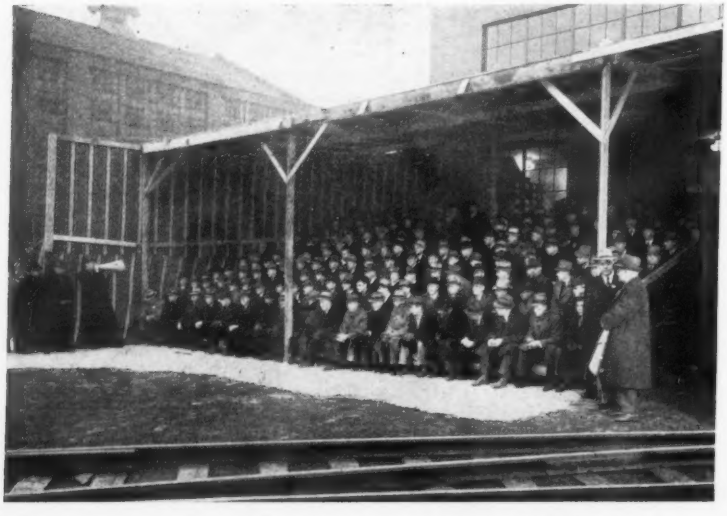
200 See Air Circuit Breaker Demonstration

More than 200 utility and industrial engineers and executives witnessed the testing of a compressed air circuit breaker at the maximum short-circuit capacity of the largest high-power laboratory in the country during an air breaker demonstration held by the Westinghouse Electric and Manufacturing Company, March 5, at its East Pittsburgh works.

The compressed air breaker, a newly developed device, was tested on power interruptions ranging from the opening of normal load current of 2000 amperes at 13,200 volts to the three-phase, 1,500,000-kva. short circuit capacity of the high-power laboratory. Oscillograms made during the demonstration showed that all currents were interrupted at the first current zero, with about one-half cycle of arcing, and throughout the entire range of tests no transient voltage greater than twice normal was observed.

Following the completion of tests the breaker was dismantled to show guest engineers how astonishingly small was the amount of wear on both moving and stationary contacts in a breaker of this type after a series of operations. A second series of tests was applied to a smaller new air breaker utilizing an adaptation of the "Deion" principle. The three-phase, 2300-volt unit tested had a normal rating of 1200 amperes and an interrupting capacity of 150,000 kva. Opening a short circuit of approximately 175,000 kva, this breaker cleared all faults within ½ cycle of arcing.

Acting as informal master of ceremonies, R. E. Frenger, manager of Westinghouse switchgear sales, commented on the tests and conducted a question-and-answer session at the end of the demonstration. L. R. Ludwig, manager of the company's air circuit breaker engineering department, described engineering features of the breakers themselves and discussed and interpreted the tests as they proceeded.



This group of utility and industrial engineers met at the Westinghouse East Pittsburg works recently to see air circuit breakers tested at 1,500,000 kva short circuit capacity.

New Chief Executive For Dallas Power and Light

Advancement from the position of power salesman to chief executive of a metropolitan utility company in ten years is the amazing record of George L. MacGregor, of Dallas. Mr. MacGregor was appointed vice president and general manager of the Dallas Power and Light Company at a meeting of the company's directors held early in March. In this capacity he will also act as chief executive of the company, no president being elected to fill the vacancy created by the recent death of C. W. Davis, former president.

The meeting of the directors followed the stockholders meeting at which all directors were re-elected, including Frank E. Austin, E. L. Flippen, W. E. Holland, T. E. Jackson, C. R. Jones, George W. Loudermilk, G. L. MacGregor, H. B. Parris, F. M. Ryburn, and Edward Titche, and H. K. Doyle, chief engineer, was elected to fill the vacancy on the board of directors resulting from the death of Mr. Davis.

George L. MacGregor

Other officers appointed were W. E. Holland, vice president; H. B. Parris, secretary and treasurer; H. G. Elmore, assistant secretary and assistant treasurer; J. V. Norvell, assistant secretary; and W. Autry Norton, general counsel.

Mr. MacGregor became associated with the company in May 1929 as power salesman. He was made head of the industrial sales division in 1931 and promoted to the position of general sales manager in 1933. Last year he was elected a director at the annual meeting of the company's stockholders and immediately afterwards he was appointed vice president and assistant to the president. A native Texan, Mr. MacGregor was educated in the public schools of Waco and at the University of Texas. After receiving his degree in electrical engineering, he went to Pittsburgh as a student apprentice with Westinghouse Electric and Manufacturing Company. This work was followed by two years as factory sales correspondent in the power and marine propulsion equipment department of the company. He left Westinghouse in 1926 to join the Poole Engineering Machinery Company at Baltimore, as a salesman, and then became sales manager of the firm which position he held in 1929 when he resigned in order to return to Texas and become associated with the Dallas Power and Light Company.

I'm Bringing YOU Business!

Every house needs **Westinghouse**

ATER STORE TRAFFIC is the first ob-
ve of the "Advise-a-Bride" Program. All
rtising directs the reader to dealers' stores.
in with this "stopper" window display.

PROSPECTS MUST COME TO YOU for their free entry blanks. Get them to "register" when they come in! You'll find many are good prospects that can be followed up and *sold*.

TRADING UP is made easier because attention is focused on the higher-priced models during the contests. This means bigger units of sale, *extra dollars* for you.

NEW WESTINGHOUSE "ADVISE-A-BRIDE" CONTESTS OPEN DOOR TO BIGGER REFRIGERATOR SALES AND PROFITS

You've a *date* with this girl . . . and *April 18th* is the day. Then for *five consecutive weeks* she's going to work for you—bring you dozens, possibly hundreds, of "live" refrigerator prospects. Not only will she "bring 'em in," but she'll help you *sell* them—and many will be the more expensive, more profitable models. Who is she? Why, the Westinghouse Bride, around whom the year's most spectacular refrigerator promotion has been built.

Nearly *half a million dollars* will be spent to put this young lady over—in magazines, radio, newspapers and displays. Another $23,000.00 in prizes will be given away *free* in the most simple, most practical contest-program ever developed. It's a *retailer's own type* of promotion—free from red tape, and with a whale of a sales "kick." Your Westinghouse Refrigerator Representative will be glad to give you all the details. But, you'd better act NOW! Here's one "bride" that's going places . . . and how!

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY • DEPT. 110 • MANSFIELD, OHIO

TUNE IN "MUSICAL AMERICANA", THURSDAY NIGHTS, N. B. C. BLUE NETWORK

Westinghouse Refrigerator

The Pacemaker.. now Faster for '40!

Appliance Sales React To Rate Reductions

Residential consumers of TVA power purchased $7,072,000 worth of electrical appliances during the year of 1939, the Tennessee Valley Authority has announced. During the last five months of the year, 800 private appliance dealers sold more than $835,000 monthly, it was stated.

Included among the appliances sold were 15,806 refrigerators, 7,655 electric ranges, 2,621 water heaters, 962 water pumps, 2,002 space heaters, 8,936 washing machines, 448 ironing machines and 108,935 miscellaneous appliances.

Authority officials estimated that these appliances will result in the use of nearly 30 million kilowatt hours of electricity annually.

A total of 365,800 customers were using TVA power at the end of the year of which 304,400 were residential consumers, it was announced. The total number of customers at the beginning of the year was 94,900, the great increase resulting from the purchase of electric properties from privately owned public utilities—notably the Tennessee Electric Power Company—by the Authority and by municipalities and cooperative associations. At the end of the year about 9,000 customers were being served directly by the Authority, and this number has since been reduced to about 6,700. The reminder of the 365,800 are customers of municipal and cooperative electric systems.

The number of appliance dealers reporting their sales to the Authority increased from 400 to 800 during the year. The 800 dealers represent a total employment of about 3,000 persons engaged in selling and servicing appliances. This does not take into account the employment resulting from the manufacture and transportation of the appliances, most of which are made in northern communities.

New Graybar Branch Manager

S. L. Cook has been appointed manager of the Nashville branch, according to recent announcement by Graybar Electric Company, Inc., New York. Mr. Cook first became associated with Graybar in 1928 when he joined the company as a salesman at Nashville.

Hotpoint Girls Have Effective Bowling Team

The Hotpoint Girls Bowling Team of Atlanta, Ga., is winning honors for General Electric Supply Corporation, Hotpoint distributors, where they are employed, as well as for themselves and Hotpoint products. The young ladies organized the team on their own initiative, paying for their Hotpoint uniforms by conducting football pools during season last Fall. The uniforms carry the Hotpoint insignia on the blouse-backs. To pay operating expenses, they are allowed proceeds from the building's Coca-Cola machine, two days a week.

During a recent visit to Atlanta, W. A. Grove, Hotpoint advertising and sales promotion manager, stopped to congratulate the Hotpoint girls bowling team of Atlanta, which is winning honors for General Electric Supply Corporation. In the picture, left to right, are: Dorothy Chapman, captain; Mr. Grove; Lucille Jones, Louise Whitaker, H. D. Peacock of General Electric Supply Corp.; Edith Wade, Eunice Hamilton, J. T. Nee, Hotpoint Atlanta range sales supervisor, and Martha Barton.

Carolina Contractors Will Meet in Greensboro

The annual meeting of the North Carolina Association of Electrical Contractors will be held Thursday, May 2, at the O'Henry Hotel, Greensboro, N. C., according to announcement by Leon Kite, field representative of the association.

Diverging from their usual custom, the annual meeting of the association will take the form of an electrical industry meeting, and jobbers, manufacturers, utilities, and inspectors of North Carolina are being invited to participate in the meeting as well as all electrical contractors.

While the general purpose of the annual meeting is to permit exchange of information as to the latest methods, materials and practices employed in the electrical industry, this meeting will have as its purpose particularly the promotion of more friendly business and social relationship between the various branches of the electrical industry of the state.

Georgia Power Leads in Kilowatt-Hour Sales

An analysis of reports from 132 utility companies serving over 13 million domestic customers places Georgia Power Company in top rank for all companies east of the Rockies in kilowatt-hour sales and low average costs. For the year 1939, the Georgia Power Company's kilowatt-hour sales per residential customer averaged 1,446, an amount 61 per cent greater than the national average kilowatt-hour sales per residential customer of 897. The average price of approximately 2.84 cents per kilowatt-hour paid by domestic electric consumers of the Georgia Power Company was 29 per cent less than the average of 4 cents per kilowatt hour paid by domestic consumers throughout the nation.

Highlights of the company's analysis of this survey were:

The company had the highest average kwh sales per residential customer of utilities east of the Rocky mountains; and fourth highest in the nation.

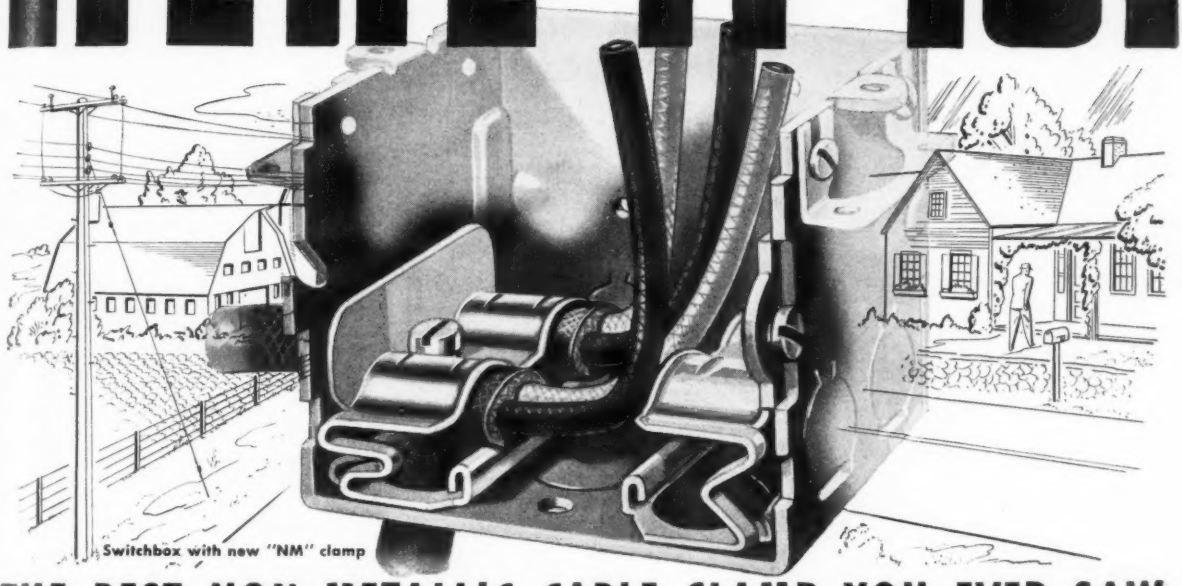
The company obtained the lowest average price per kwh of utilities east of the Rockies; and fifth lowest in the nation.

The company sold the greatest number of electric water heaters of utilities in the nation.

The company sold the greatest number of electric refrigerators in the southeast; and eighth greatest number in the nation.

The company sold the greatest number of electric ranges of utili-

HERE IT IS!



Switchbox with new "NM" clamp

THE BEST NON-METALLIC CABLE CLAMP YOU EVER SAW

"NM" Clamp

You'll like this new Raco • All-Steel product and the way it solves the non-metallic-cable-clamp problem. It is the satisfactory answer to the needs created by the rapidly increasing use of non-metallic cable and the tendency toward the use of heavier conductors for circuit wiring.

The "NM" clamp permits the cable to enter at side (end) or bottom, or both simultaneously. Because of its construction, this clamp protects the cable from the shearing action of the sharp edges of the knockout. The possibility of injury to the cable is eliminated. It accommodates a wide range of cable sizes, from the full capacity of the K. O. down to the smallest CNX type. Clamp is held clear of the knockout until you're ready to use it. And *the "NM" clamp is available in both switch and outlet boxes.*

Outlet box with new "NM" clamp

Standardizing on Raco • All-Steel • Products assures you of products that have been kept up-to-date. They provide many advantages for rural and urban modernization work, as well as on new jobs. Write for a copy of the Raco • All-Steel • Products catalog—there is no obligation.

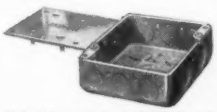
Distributed nationally by:

ALL-STEEL-EQUIP COMPANY
INCORPORATED
204 Griffith Avenue, Aurora, Illinois
Factories: **South Bend, Ind.; Aurora, Ill.**

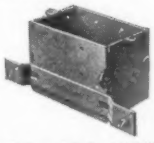
RACO • ALL-STEEL BEVELED CORNER SWITCH BOX for all types of non-metallic cables.

RACO • ALL-STEEL METALLIC CABLE BOX —3½" or 4" octagon with non-protruding clamp screws. Box may be installed on flat surface.

RACO • ALL-STEEL BOX for sidewall bracket—2" vertical adjustment. Bridge is threaded for ½" nipple and equipped with set screw.



RACO • ALL-STEEL 4" SQUARE BOX with mounting bracket. Simplifies the installation of switches and receptacles.



RACO • ALL-STEEL "SIDE-MOUNT" SWITCH BOX. Mounts to side of studding affording a neater wallboard job. Bracket is detachable.

RACO • ALL-STEEL • PRODUCTS
Switch Boxes • Outlet Boxes • Cutout Boxes • Cabinets • Conduit Fittings
Distributors in All Important Centers

ties in the southeast; and third greatest in the nation.

The company had the greatest dollar volume of appliance sales of utilities in the southeast; and eighth greatest in the nation.

Raybro's Direct Mail Plan Builds Dealer Business

Raybro Electric Supplies, Inc., appliance and electrical supply wholesalers with branches in Tampa, Jacksonille and Miami, are repeating again this year a direct-by-mail advertising plan, which in the past has proven itself a business-getter for appliance dealers.

"This mail promotion," says J. A. Meier, the firm's general sales manager, "represents a type of advertising which every electrical appliance dealer can and should use. Dealers always agree with us, when we suggest direct mail promotion comparatively but few have put the idea to practical use. Therefore, we established a method by which any of our dealers who wished to take advantage of it might canvass his prospect list by mail at no greater expense than the cost of stationery and postage."

The details of the plan for presentation to dealers are mimeographed on a single sheet, to which are attached the letters in the series. The dealer furnishes his list of prospects, together with a sufficient quantity of his own imprinted stationery (letterheads and envelopes) for mailing to at least 200 names. The dealer stands the cost of the postage at the rate of 1½c per name.

Mr. Meyer's formula for "letters which sell" can be expressed briefly as follows: "Invite the prospective customer into your store. Tell him in crisp but courteous language what you want him to look at when he accepts your invitation. Concentrate his attention on a single line or a few related lines. Use generous margins; make your copy a small island of black lettering on a sea of white paper. Make what you have to say stand out so clearly that your letter will convey a message, even while it is on its way to the wastebasket."

Adequate Wiring Field Reports

James B. Hodge, sales manager of the Gulf States Utilities Company, Baton Rouge, La., reports that more than 2000 persons registered at the company's adequate wiring booth in the recent National Home Show. The display was composed of two boards which demonstrated adequate vs. inadequate wiring and the voltage drop obtaining in an inadequately wired house. Out of the 2000 who registered, 400 said they needed additional outlets and would be glad to have an electrical contractor give them an estimate. In pointing out that this was the company's first venture in the promotion of adequate wiring, Mr. Hodge added that results were very satisfactory.

* * *

Two meetings, one for architects the other for residential building contractors, were held in Norfolk, Va., on March 4 under the auspices of the Norfolk Adequate Wiring Bureau and were addressed by Art Schanuel, field representative. A. E. Dunn, secretary of the Norfolk Adequate Wiring Bureau, says that "as a result of Mr. Schanuel's excellent work both the architects and builders here are showing a great deal more interest in the adequate wiring program."

This fine group composes the Tampa personnel at headquarters of Raybro Electric Supplies, Inc. Troy A. Brown, vice president and general manager, reports that the company enjoyed their best year during 1939. The company now operates branches in Jacksonville and Miami, keeps twelve men traveling South Georgia and Florida, and operates a personnel totalling fifty-two.

Hotpoint Executive Line-Up Changed

George A. Hughes, known throughout the electrical industry as the "father of the electric range," was elected chairman of the board of the Edison General Electric Appliance Company of Chicago (better known as the Hotpoint Company) at a recent meeting of the board of directors in New York City. Mr. Hughes has been president of the company since its organization. In his new position, he will continue to be active in the business.

A. D. Byler, for 16 years vice president and general manager, succeeds to the office of president.

A. D. Byler **R. W. Turnbull**

Mr. Byler's career typifies the pioneering spirit, implicit in American industry, particularly the electrical industry. Born in the Ozark Mountains, he received his early schooling in Springfield, Missouri. Following a correspondence course in electricity, he joined a crew of railway linemen, where he was soon made foreman. In 1906, Mr. Byler went to work in the shops of the Commonwealth Edison Company, Chicago, and began his formal engineering training. For a good many years he attended evening classes in engineering subjects at Armour Institute and Northwestern University. Mr. Byler made steady progress with the Chicago utility, finally becoming Superintendent of Shops.

On January 1, 1920, Mr. Byler joined the Hotpoint Company as Industrial Engineer. Since then, he occupied various positions until on March 3, 1924, he was elected vice president and general manager.

R. W. Turnbull, who has been vice president in charge of sales, now becomes first vice president. Probably one of the best-known men in electric appliance merchandising, Mr. Turnbull began his appliance career in 1910 as a salesman for the Southern California Edison Company. The following year he joined the Pacific Electric Heating Company, Ontario, California, which made the original line of Hotpoint electric appliances. When the present Hotpoint organization was formed in 1918,

he New 1940 Hotpoint
alrod Units are now avail-
ble for replacement on
ractically all makes of
lectric ranges.
Hotpoint
CALROD UNITS
It's needless to gamble. Hotpoint gives you Calrod, the undisputed leader among cooking units—invented, perfected, field-tested and proved by Hotpoint—the oldest and largest electric range manufacturer in the world.

ew 1940 Hotpoint Calrod

Electric Cooking Unit Has Many Exclusive Features

AGAIN Hotpoint advances the standard of electric range units with this lighter, faster-starting, self-cleaning 1940 Calrod. It costs less than ever—provides more improvements—makes experiment with unproved units unnecessary.

HOTPOINT CALROD PROVIDES MORE FEATURES AT LESS COST

1. **LIGHTER** in weight by 20% than old style rod-type units.
2. **FASTER**—Hotpoint's 1940 Calrod starts cooking in less than half a minute.
3. **SELF-CLEANING**—Calrod coils are self-cleaning. No cracks or crevices to catch grease. New, easily removable reflector can be washed like a pie tin.
4. **INCONEL METAL SHEATH**—Calrod is the only unit using International Nickel Company's Inconel which contains approximately 93% nickel and chromium.
5. **GLASS SEALED LEADS**—Prevents seepage of air or moisture into insulation; prolongs life.
6. **PROTECTED BY 67 U. S. PATENTS**—Hotpoint Calrod gives you a tremendous edge on competition.
7. **PROTECTED TERMINALS**—Calrod is the only unit with side terminals—out of heat and spillage zone.
8. **CORROSION RESISTANT**—Calrod is the only unit entirely built of corrosion-resisting materials.
9. **LONG LIFE**—Calrod is 99.99% perfect by field experience—assuring satisfied customers and negligible service costs.
10. **ECONOMICAL**—Calrod provides more heat from less current. You can prove this in two minutes.

EDISON GENERAL ELECTRIC APPLIANCE CO., Inc.
5614 West Taylor Street, Chicago, Illinois

y HOTPOINT CALROD es Possible 2-Way Profit

UNIT REPLACEMENTS. Hotpoint od—the outstanding electric range elopment for 1940 is specially de- ed for the replacement market.

NEW RANGE SALES. New sales of 40 Hotpoint Electric Ranges are also ur rich reward for putting this Cal- d Replacement Plan to work.

Get all the facts about Hotpoint's 2-Way Profit Replacement Plan from your istributor or Hotpoint representative.

With only seven Stainless Steel Adapter Rings you can fit practically all makes of Electric Ranges now in use.

Hotpoint
Calrod
THE ONLY ELECTRIC RANGE SURFACE UNITS WITH
INCONEL SHEATH AND GLASS SEALED TERMINALS

he became sales representative for the Pacific Northwest, and in 1924 was made Pacific Coast district manager. His unique understanding of electric appliance merchandising and his genius for organization brought him, in 1931, the appointment as vice president in charge of sales.

Southern Section Drive For Membership Continues

Nearly a hundred new members for the Southern Section, International Association of Electrical Inspectors, have been enrolled as the result of a special membership campaign begun last fall, according to Joseph Whitner, secretary-treasurer of the section.

Particular interest in the Association is being exhibited by the electrical industry of Texas. New members from this state account for 46 of the total of 99 enrolled in the Southern Section since the membership campaign started last fall. New members include many electrical contractors and utility men as well as electrical inspectors.

Members who have submitted and endorsed new member applications since the drive began include the following:

Armstrong, W. E.	New York, N. Y.	1
Benefield, F. H.	Atlanta, Ga.	1
Bommer, A. J.	Dallas, Texas	4
Bowry, T. W.	Richmond, Va.	1
Branch, T. P.	Atlanta, Ga.	3
Bulls, Claude V.	Norfolk, Va.	2
Camus, Frank G.	Shreveport, La.	1
Cannady, N. E.	Raleigh, N. C.	1
Dunn, W. Edward	Alexandria, Va.	1
Evans, Carl W.	Atlanta, Ga.	3
Goodson, Fred	Houston, Texas	6
Hancock, A. E.	Austin, Texas	4
Hendricks, R. B.	Llano, Texas	10
Lee, J. Duval	Lynchburg, Va.	1
Littlefield, R. T.	Jesup, Ga.	2
Johnson, Dewey	Atlanta, Ga.	1
Kenderdine, E. L.	Fort Worth, Texas	2
Knoderer, H. G.	Bridgeport, Conn.	1
Hinton, Thos. E.	Schulenburg, Tex.	1
Miller, G. M.	Richmond, Va.	4
Muller, P. L.	New Orleans, La.	1
Muths, S. L.	Gulfport, Miss.	1
Pockrus, L. S.	Tyler, Texas	2
Pyles, J. Warner	Washington, D. C.	2
Segall, B Z.	New Orleans, La.	2
Sprouse, J. B.	Clarksdale, Miss.	2
Stewart, W. B.	San Antonio, Tex.	5
Taylor, W. R., Jr.	Atlanta, Ga.	1
Wagner, C M.	Hondon, Texas	2
Walthall, J. D.	Homer, La.	1
Wheeler, Chet	New Orleans, La.	2
Whitaker, C. S.	Durham, N. C.	6
Whitner, Jos.	Atlanta, Ga.	8
Zimmer, Chas. S.	Houston, Texas	1
Miscellaneous	(not endorsed)	13
Total		99

Georgia Illuminating Engineers Active

An active spring program has been announced by the Georgia Chapter of the Illuminating Engineering Society. Featured speaker at the Chapter's meeting March 8, in Atlanta, was Henry L. Logan, managing engineer of the Holophane Company, New York. His subject was "How Good Is Illuminating Engineering?" Mr. Logan was well qualified to discuss the present status of illuminating engineering since he has demonstrated his engineering ability in the lighting of some fifty-three buildings at the New York World's Fair, broadcasting studios in New York's Radio City and Hollywood, the Museum of Modern Art, and many other outstanding installations.

Two meetings are scheduled by the Chapter for April, one on April 3 and another on April 14, both to be held in Atlanta. Dr. Matthew Luckiesh, director, Lighting Research Laboratory, General Electric Company, Cleveland, was scheduled to address the April 3 meeting on "New Horizons." Lester H. Graves, president of the Illuminating Engineering Society and vice president of Curtis Lighting, New York City, is scheduled to make his annual presidential visit to the Georgia Chapter some time during the week of April 14.

Rural Cooperatives Want State Lines Transferred

Representatives of the South Carolina Rural Electrical Cooperative Association, representing rural electrical cooperative membership corporations in various parts of the state, recently asked the South Carolina State Rural Electrification Authority to turn over to them about 855 miles of lines in eighteen counties. They based their request on the ground that these lines were necessary to connect cooperative systems now in the process of construction and to make their operation more economic and more efficient.

Backers of the cooperatives maintain that the State REA should be discontinued as a builder of lines with federal funds.

The board of directors of the State Rural Electrification Authority decided to ask the legislature to express its wishes in the matter and transmitted a resolution to the State Senate and House of Representatives.

Membership Growing in Texas Chapter, I.A.E.I.

Nearly a hundred members and guests of the Texas Chapter, International Association of Electrical Inspectors, met at the Texas Hotel in Fort Worth in the latter part of February. The meeting was judged the most successful of any since the Chapter was organized. A considerable increase in interest in the Chapter's activities has been noted recently and 47 new members have been enrolled in the last six months.

The meeting was called to order by the state president, A. J. Bommer, Underwriters Laboratories, Dallas. Highlights of the meeting were discussions on the changes that will become effective in the 1940 edition of the Code which were led by Victor H. Tousley, national secretary, I.A.E.I., and special sessions provided for discussions on rural wiring practice. R. B. Hendricks, vice president of the chapter, presided over these sessions in which considerable interest was indicated. Twenty REA inspectors from all sections of the state were present.

John Feis, building inspector for the City of Dallas, brought up the subject of voltage drop in electrical installations and considerable discussion followed.

Plans for the next chapter meeting, to be held in San Antonio some time during May, were announced at the closing session.

News about People—

Claude Hendon, who has been with General Electric Company for twelve years, holding for the last five years the position of manager of small appliance and elec-

tric fans department, has been elected vice president in charge of merchandising and a member of the board of directors of the Silex Company.

* * *

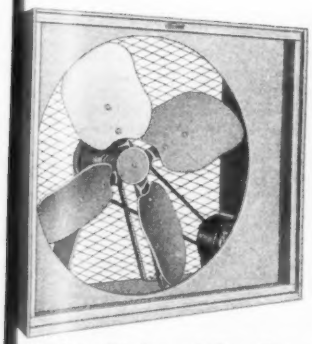
Announcement has just been made of the appointment of **Ernest Hail,** 901 Sul Ross Street, Houston, Texas, as representative for the Kwikon Company, Chicago, manufacturers of a wide range of electrical fittings and devices. Mr. Hail's territory will include all of Texas with the exception of the city of El Paso.

* * *

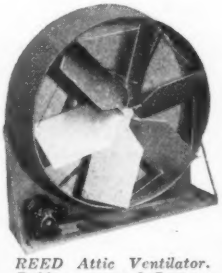
L. G. Snyder has joined the Metropolitan Device Corporation, Brooklyn, New York, as sales manager in charge of central station sales. Mr. Snyder has been associated with electrical utilities for many years and is especially well known in the South, having formerly been connected with the

(*Continued on page 51*)

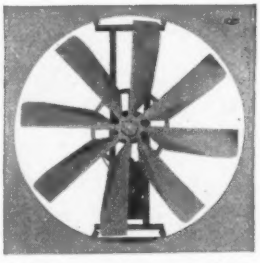
AIR CIRCULATING AND COOLING EQUIPMENT



KOOL Attic, Window and Floor Fans sturdily built for quiet, efficient operation. Attic fans furnished with or without louvers and grills, 4500 to 16000 C.F.M. 1 year guarantee E.H.F.A. approved. Kool Products Co., Inc.

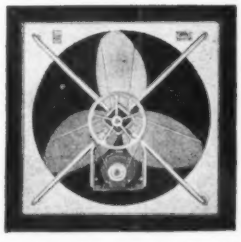


REED Attic Ventilator. Rubber mounted Century motors. Oilless fan shaft bearings. Certified ratings. Exceptionally quiet operation. Reed Unit-Fans, Inc.



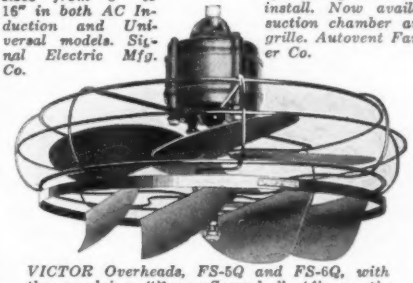
COOLAIR'S improved home-cooling fan for 1940—all moving parts "float" in larger, sound-absorbing springs. Ultra-quiet, easy to install, lightweight steel frame and blades, long hour service motors. 12 sizes for homes, 16 for commercial jobs. American Coolair Corporation.

SIGNAL'S Deluxe streamliner. Desk Type Fans available in a range of sizes from 8" to 16" in both AC Induction and Universal models. Signal Electric Mfg. Co.

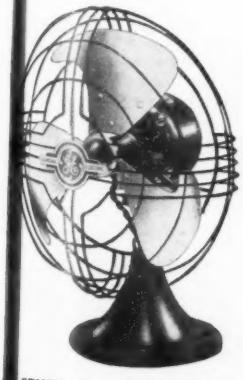


COOLVENT Improved 1940 Comfort Cooling Fans handle more air at slower speeds. Quieter operation. Easier to install. Now available with suction chamber and ceiling grille. Autovent Fan & Blower Co.

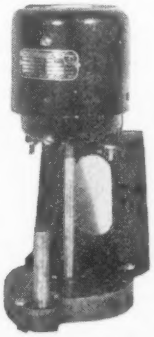
HUNTER Adaptair Hotel Type 52" Ceiling Fan. Instantly adjustable for either up or down draft. Hunter Fan & Ventilating Co., Inc.



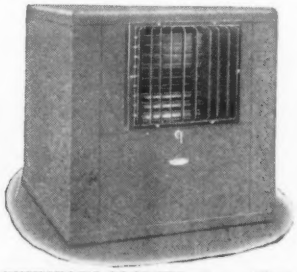
VICTOR Overheads, FS-5Q and FS-6Q, with the revolving "Breeze-Spreader" (finger tip control for degrees of air spread) delivers breezes evenly without drafts over a wide floor area. 12 and 16 inch sizes. Victor Electric Products, Inc.



GENERAL ELECTRIC Super-Quiet Fan (oscillating and non-oscillating) with the new scientifically shaped and pitched Vortalex blades for greater air movement and quieter operation. Streamline guard design. General Electric Co.

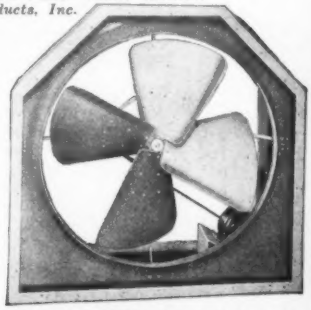


K & H Evaporative Cooler Pumps. Built for long service. Fully enclosed motor water-proof. Needs oiling only once a year. K & H Mfg. Co.



"KUMFORT-COOLER"—for offices, retail establishments, beauty parlors, etc. Cools 8 to 12 degrees below outdoors. Furnishes fresh, washed and filtered air, free of dust, dirt and odors. Portable model 1200 cubic feet per minute capacity. Stationary models from 2800 cu. ft. to 22,000 cu. ft. per minute. Hall Mfg. Co., Cedar Rapids, Iowa.

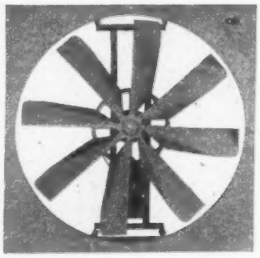
BUFFALO Breez-Air Attic Fans are made in a complete range of sizes, capacities from 4,000 to 17,000 c.f.m. This line features quiet operation, requires no springs or other special mountings. Buffalo Forge Company.



SCHWITZER-CUMMINS Cabinet Model Home Ventilator. 30", 36", 42" and 48" diameters. 7,000 to 20,500 C.F.M. All welded construction. Cabinet insulated for sound proof operation. Fan has discharge shroud to aid efficiency. Schwitzer-Cummins Company.

NO KICKBACKS-
GREATER PROFITS
with
Coolair
TRADE MARK

ATTIC FANS



THIS year more than ever before, when cheap, inefficient attic fans are flooding the market, Coolair dealers are profiting handsomely on the Customer Satisfaction built into every Coolair fan.

Quality — resulting from 12 years of continuous improvement in design and materials.

Quietness—that comes from patented sound-absorbing built-in springs, oversize ball bearings in fan hub, and superior blade and frame design throughout.

No Kickbacks—that mean profit eating trouble calls and disgruntled customers . . . *because the Coolair fan does the cooling job it's supposed to do, efficiently and quietly!*

Sell the Coolair line of home-cooling and commercial exhaust fans. Make real profits that won't be slashed by after-sale servicing. Every home-owner and businessman a prospect, every buyer a booster. Get ready now for the rush of hot weather business.

Write or wire today for this FREE illustrated catalog and the complete Coolair plan of sales promotion to help you make more money this summer.

MAIL THIS COUPON TODAY!

Please tell me how I can make money with Coolair this summer.

NAME _____

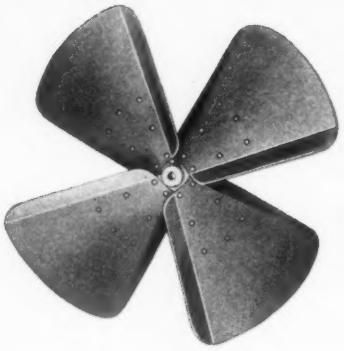
ADDRESS _____

CITY _____ STATE _____

Coolair Ventilating and Cooling Systems

AMERICAN COOLAIR CORPORATION
Manufacturers . . . . JACKSONVILLE, FLORIDA

BUY A POWERFUL, SILENT, CODE TESTED FAN BLADE FOR YOUR ATTIC FANS



SIMPLIFY YOUR MANUFACTURING AND SAVE MONEY

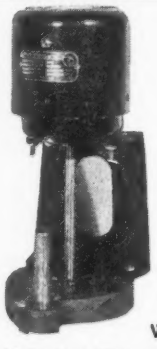
Our standard Attic Fan Blade is offered to the industry in all of our regular sizes and capacities. The 30″, 36″, 42″ and 48″ Fans have a delivery range from 7,000 C.F.M. to 20,500 C.F.M.

Quiet, efficient Attic Fan Blade Assemblies, carefully balanced and sturdily built assure you a highly saleable unit. Write us for further information and prices.

AIR CONDITIONING BLOWERS

4½″ to 50″, Single and Double Inlet, catalog available.

BLOWER DIVISION
SCHWITZER-CUMMINS COMPANY
125 FAN STREET INDIANAPOLIS, U. S. A.



K & H Evaporative Cooler Pumps

— Built for Service —

Fully Enclosed Motor (Water-proof) . . Needs Oiling Only Once a year

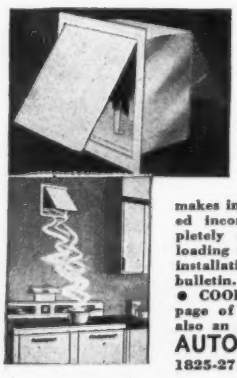
YOUR PUMP TROUBLES ARE OVER WHEN YOU INSTALL K & H

Write for Information and Prices

We Also Make Blowers—Very Attractive Prices

K & H MFG. CO., 3410 Ross Ave., DALLAS, TEXAS

New AUTOVENT *Remote Control*
KITCHEN VENTILATOR



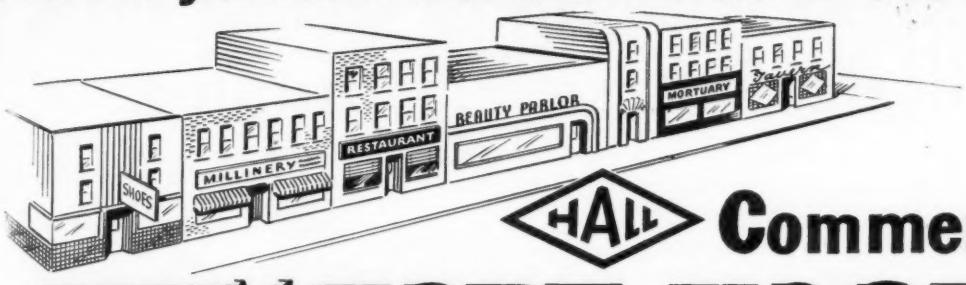
● Preferred by home owners because of remote control and efficiency in removing cooking odors. EASE OF INSTALLATION — quiet operation and SELF-OPERATING DOORS . . . makes a hit with contractors and dealers, too.

NEW FEATURES INCLUDE — Adjustable wall sleeve—it's easily adaptable to any wall thickness. ● Remote control not only eliminates cords, rods and chains but makes installation easy in locations heretofore considered inconvenient. ● Self-operating doors plus completely automatic operation. ● Exclusive non-overloading fan wheels. ● Quiet operating motors. ● Low installation and operating costs. ● Send for new bulletin.

● COOLVENT ATTIC FAN described on introductory page of Air Conditioning Section, this publication, is also an AUTOVENT product.

AUTOVENT FAN & BLOWER CO.
1825-27 N. Kostner Ave. Chicago, Ill.

NOW you can work *this* side of the street-



HALL Commercial KUMFORT KOOLER

opens new profit possibilities - - costs only about 1-5 as much - - - satisfies existing demand at a price every business can afford - - - -

YOU know that cafes, beauty parlors, neighborhood theaters, mortuaries, miscellaneous retail establishments — *all* have *wanted* summer cooling, knew they needed it, but realized they could not afford expensive installations.

The Hall Kumfort Kooler is engineered to enable you to cash in on this existing demand. This equipment costs only about one-fifth as much, yet it provides efficient air-cooling up to ten tons, at low operating cost.

Engineered on Evaporative Principle

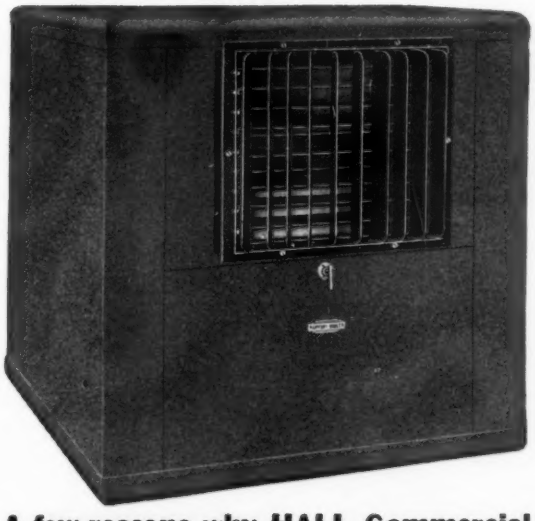
In engineering circles, it has long been recognized that for many establishments, cooling units built around the evaporative principle are the most practical type. The Hall Commercial Kumfort Kooler is quickly installed, requires small space, does not cause interruption in business. You can make every installation with complete confidence, because Kumfort Kooler represents thorough experience in the design and construction of evaporative cooling equipment.

Offers Genuine Service Advantages

Under average conditions, the Hall Commercial Kumfort Kooler maintains an inside temperature 8 to 12 degrees below outdoors. Because its "effective temperature" is even lower, because it cools through 100% fresh, cooled and filtered air, its installation also means greater employee efficiency. The installation of a Hall Kumfort Kooler insures summer patronage—that's why business operators everywhere will welcome your representative!

New Profits for Dealers

It will pay you to fully investigate our dealer franchise. The Hall Commercial Kumfort Kooler, because it is low in first cost and lower in operating cost, because it gives satisfactory service, means profits which you have had to pass up. Behind this product is a concern with a nation-wide reputation for 30 years of reliable manufacturing. At all times, the home office sales department and factory engineering service are available when needed. We urge you to write us today for complete information. The best selling season is just around the corner.



A few reasons why HALL Commercial KUMFORT KOOLER IS EASY TO SELL...

1. Unit cost is about one-fifth as much (or less). High installation costs are eliminated.
2. Operating costs are extremely low, are offset many times by additional business created.
3. Cools to proper comfort point—8 to 12 degrees below outdoors. "Effective" temperature even lower.
4. Greater employee efficiency results because it uses 100% fresh, filtered and cooled air—eliminates three o'clock headaches.
5. Dust, dirt and odors are effectively eliminated. Inside pressure counteracts infiltration of dust—a real factor in many localities.
6. Hall Roto-Atomizer insures even saturation, essential to an effective job of air cleaning and comfort cooling.
7. Cooling commences the moment the unit is turned on—no long precooling period is necessary.

FACTORY ENGINEERING SERVICE is available for analysis of installation data and plans — additional assurance of customer satisfaction.

HALL MANUFACTURING CO.

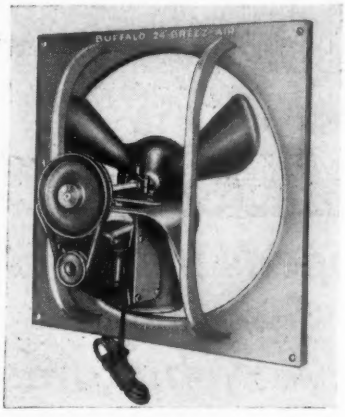
CEDAR RAPIDS, IOWA

$2,000,000 Worth of HOME COOLING FANS Will Be Sold This Summer

That's a lot of fans in any language. If you want to get *your* full share of this rapidly growing business, we urge you to get the facts now on the Buffalo Breez-Air Franchise.

When you sell Breez-Air Fans, you offer your customers fans of finest quality, designed by fan engineering experts to run *quietly* and economically for many years. If you are interested in the future as well as the present, you will be glad you chose the Breez-Air line of Home Cooling Fans.

Hot weather will soon be here. You'll be ready to make the most of it if you write us today for complete information on Breez-Air, the Fan of today and tomorrow.



BUFFALO FORGE COMPANY
210 Mortimer St., Buffalo, N. Y.

"Buffalo" BREEZ-AIR FAN
The Quality Home Cooling Fan

List Price $9.95

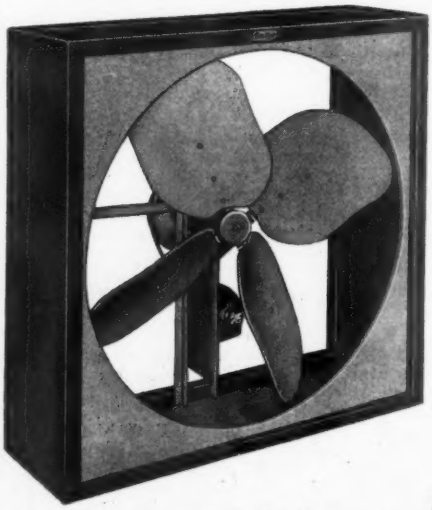
NEW an ideal leader for YOUR 1940 FAN LINE

Here's a streamline 10 inch COOL SPOT oscillating fan that through the use of heavily pitched, quiet type fan blades and slow speed Induction motor delivers 610 C. F. M. and is unusually efficient and quiet . . . adjustable for oscillating or non-oscillating operation. Its other features mark this fan as dependable quality at the right price. See your jobber now, or write for complete details.

SIGNAL

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan, U. S. A.
Branch Offices:
W. E. Hopper
357-59 Marietta St., Atlanta, Ga.
Geo. E. Anderson
Santa Fe Bldg., Dallas, Texas

STAKOOL Ventilating FANS
Attic, Window and Floor Models



LIST PRICES
24" . . $ 47.50
32" . . $ 57.50
44" . . $ 80.00
54" . . $125.00
4500 to 16000 CFM

Low priced, factory-built tunnels, with grilles, or grilles only furnished for attic fans.

FAN BLADES Only $6.90 to $17.50 List Price

All prices F.O.B. Factory.

Engineered for Quiet, Efficient, Economical Operation
G-E Motors with THERMO-TECTORS used exclusively
E.H.F.A. Approved—Five Year Guarantee
Liberal Discounts to Distributors and Dealers
Write for DEALER'S MANUAL containing full information for selling and installing fans

TRADE STAKOOL MARK

MANKER PRODUCTS COMPANY, INC.
MEMPHIS, TENNESSEE

News about People—

(*Continued from page 46*)

Tennessee Electric Power Co., and having served as southeastern district meter engineer for Westinghouse in Atlanta.

* * *

Henry W. Clower and **R. H. Witherspoon,** both well known in the South as electrical manufacturers' agents, have organized a firm to be known as Witherspoon & Clower with headquarters at 376 Nelson Street, Atlanta. Among the electrical manufacturers which the firm will represent are Abolite Reflector Co., J. H. Parker & Co., Commercial Control & Device Corp., Steber Manufacturing Co., The Potter Co., The Gill Glass & Fixture Co.

* * *

The Walter V. Gearhart Company, electrical meter and instrument specialists, of Atlanta, Georgia, recently announced the opening of a branch office in Charlotte, N. C., at 1000 West Morehead Street. **Harley A. Clouse** will be in charge of the Charlotte office which will serve North and South Carolina and part of Virginia and Tennessee. Mr. Clouse is a qualified meter and control specialist and is well known throughout the Southeast.

Meter and instrument lines handled by the firm includes Duncan Electric Co., Easterline-Angus Co., Roller-Smith Co., R. E. Uptegraff Mfg. Co., Eastern Specialty Co., Struthers Dunn, Inc., Ideal Electric & Mfg. Co., and Electrical Engineers Equipment Co.

* * *

Walter Geist, vice president of Allis-Chalmers Mfg. Co., has announced the appointment of **D. S. Kerr** as manager of the company's Atlanta, Ga., office. Mr. Kerr started with Allis-Chalmers in 1922 and after serving as salesman in various of the company's offices, became manager of the Chattanooga office in 1930. As manager of the Atlanta office, he will have jurisdiction over both the Chattanooga and Knoxville offices.

* * *

Homer D. Puckett and **Lester R. Ward** have just announced the organization of the Puckett-Ward Company, with headquarters in Dallas, Texas, to handle sales for electrical, automotive and hardware manufacturers. The territory to be covered by the new firm will include Texas, Oklahoma, Arkansas and Louisiana.

Mr. Puckett was associated for twenty-two years with the General Electric Company, in Dallas, serving as manager of the incandescent lamp department for the past twenty years. In this capacity he has become well known among industrial, electrical, hardware and automotive jobbers throughout the southwest.

H. D. Puckett L. R. Ward

Mr. Ward brings to the firm fifteen years of experience in the utility business, and prior to that he was in the electrical jobbing business. For the past twelve years he was assistant to G. B. Richardson, vice president and sales manager of Texas Power & Light Company, Dallas. In this capacity, he has been in close contact with the electrical industry of the Southwest. He played an important part in developing and introducing air conditioning and both commercial and residential lighting equipment. He is a past chairman of the Illuminating Engineering Society, Southwestern Chapter.

* * *

John K. Hodnette, transformer engineer of Westinghouse Electric & Mfg. Co., was recently honored by the National Association of Manufacturers by being selected as a "Modern Pioneer of the American Industry" in connection with the Association's program celebrating the 150th anniversary of the founding of the United States patent system.

A native of Alabama, and a graduate of the Alabama Polytechnical Institute, at Auburn, Mr. Hodnett was honored for his work on distribution transformers that culminated in the completely self-protected distribution transformer, commonly designated as the "CST."

* * *

H. H. Knowles has been appointed Alabama sales representative for The Standard Transformer Company, of Warren, Ohio, according to announcement by **W. F. Parker,** president. Mr. Knowles will make his headquarters at 418-419 Watts Building in Birmingham.

* * *

W. B. Meek, associated for the past ten years with the Monroe Hardware Company of New Orleans, has just been named vice president in charge of the electrical department, according to an announcement by **Sam Ivy,** vice president and chief executive of the company. For the past five years Mr. Meeks has been manager of the New Orleans office.

Sell VICTOR FANS and watch your PROFITS RISE!

THE VICTOR FAN LINES

PRODUCT!

4 smart models in the sensational "Miracle Breeze" line—8"—10"—12"—16". Two beautiful pedestal models, 12" and 16". High velocity circulators, 20" and 22" head. Victor Overheads (nothing like 'em), 12" and 16" models. Every one a line selling number, priced to make sales and profits.

PROMOTION!

Thermometer Sensitized — Spot Broadcasts — Newspaper Ads—Mailing Broadsides — Window Streamers—Letter Stuffers, ready to be plugged into every hot spell and produce Fan Sales at a profit for you.

PROFIT!

No dead numbers in the VICTOR Line. Every fan a modern, up-to-date smart looking quality item of merchandise. You'll get turnover on the VICTOR FAN Line—and turnover means PROFIT!

ALL ABOARD!

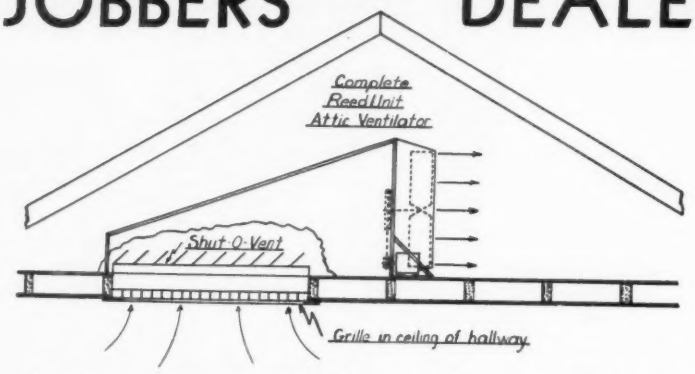
Write today for new VICTOR catalog and the VICTOR PUSH. Complete details of the line that will give you more FAN SALES in 1940.

VICTOR ELECTRIC PRODUCTS, INC.

Dept. J-3003

2950 Robertson Ave., Cin'ti, Ohio

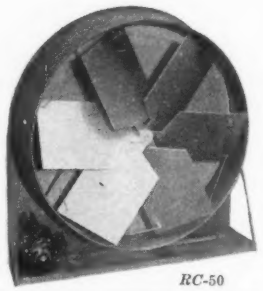
JOBBERS AND DEALERS



Four Good Reasons Why Your Customers Buy REED UNIT-ATTIC SYSTEMS

Patented

1—Venturi-Cone fan case for highest efficiency.
2—Certified Ratings by an approved unbiased testing laboratory in accordance with test code of A. S. of H. & V. E. and National Fan Mfrs. Assn.
3—Reed automatic Shut-O-Vent regular equipment —for all Reed Attic systems. A substantial steel shutter—not a flimsy aluminum louvre.
4—Blade-Flex Equalizers an exclusive new blade improvement for quiet and efficient operation.



RC-50

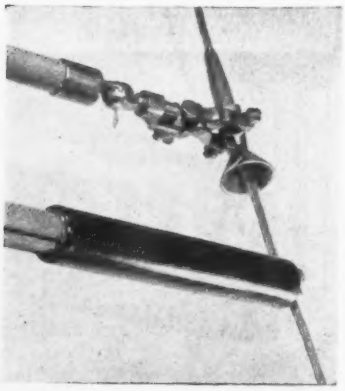
Factory: 501 N. St. Patrick St.

REED UNIT-FANS, INC.
Manufacturers of Ventilating Equipment
New Orleans, La.

Sales Office: 811 St. Charles St.

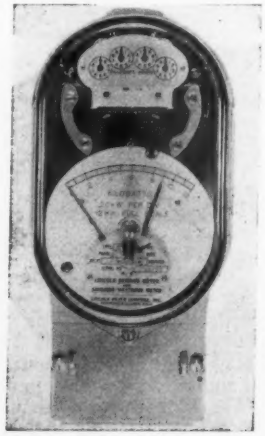
Hot Line Splicing Tool

A new Tips splice tool designed to simplify the job of making hot line splices has been announced by the A. B. Chance Company, Centralia, Mo. The splice tool, illustrated here, was designed to fit on the end of a Tips universal pole. A wing screw permits adjustment to any desired angle. The funnel shaped mouth guides the conductor into the automatic splice. The mouth of the tool is opened by turning the pole and the automatic splice is then placed in position and clamped tight by closing the jaws with a clockwise turn to the pole. When the conductors to be spliced are pulled tight with rope blocks, insulated with link sticks, the loose ends are easily guided into the cone shaped mount of the splice tool by using a Grip-All clamp stick as shown in the illustration. One or both ends of the conductor may be attached to the automatic splice in this manner thus making it possible to do the job complete without interrupting service.



Watthour-Demand Meter

A combination unit, consisting of a single phase Sangamo watthour meter and a Lincoln maximum demand meter, is announced by the Lincoln Meter Division, Sangamo Electric Company, Springfield, Illinois. Designated as Type WDE, the unit is housed in a polyphase type case with single-phase terminal chamber. The Sangamo Type HF meter is mounted in the upper part, while the Lincoln Type WD thermal demand meter is located in the lower part of the base, with a single glass cover enclosing both meters.



100-Ampere Reclosing Fuse

A 100-ampere reclosing fuse cutout in 5000-volt and 7500/12,500 Gr Y volt ratings is announced by General Electric. Similar in design to the Company's 50-ampere reclosing cutouts but constructed for heavier current duty, the new cutout offers the same advantages of automatic reclosing, maximum economy, sleet proof design, and interchangeability.

The entire reclosing mechanism is in the door. The cutout functions by automatically connecting a second fuse link in the circuit one second after the first fuse link blows. When this takes place the door of the cutout is pushed open at the bottom and a red indicator, visible from the ground, appears. If the fault persists and the second fuse link blows, the door opens to a position completely isolated from the circuit.

The cutout can be purchased complete, or the 100-ampere reclosing door can be purchased separately and put on any 100-ampere G-E indicating and drop-out cutout housing

Instrumental Test Kit

A new instrumental test kit especially designed for plant electricians and electrical contractors is described in leaflet No. 2815 just issued by Herman H. Sticht & Company, 27 Park Place, New York City. These handy test kits contain ammeter, voltmeter and current transformer, the complete kit weighing only about 10 pounds.

The ammeters have a range of 5 amperes, while the voltmeters have ranges of 150 to 600 volts. The current transformer has ranges of 1, 5, 10, 25, 50, 62½, 125, and 250 amperes primary current, with 5 ampere secondary.

Standardized Meter Trough

A complete line of Standardized Meter Troughs designed to meet every trough requirement is now available from the Electrical Division of Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. Furnished for indoor installations in sheet steel with baked aluminum finish or sheet aluminum, natural finish, or for outdoor installations, in galvannealed steel with baked aluminum finish, or sheet aluminum, natural finish, these troughs are available in one, two or three meter units for indoor use or in units of one to six for outdoor application. The indoor units have removable endwalls so that continuous troughs of any desired length can be assembled by means of a coupling strap.

Coolvent Attic Fan

A newer and more compact Coolvent attic fan is now being manufactured by the Autovent Fan & Blower Co., Chicago, Ill. In this line, fan wheel diameters range from 24 inches to 54 inches and operate at slow speeds from 281 to 577 rpm. Certified air capacities vary from 4,070 to 21,000 cubic feet per minute. Fan wheel has three blades.

In this attic fan, the motor is mounted directly below the fan shaft on a sturdy sheet steel pedestal which can be adjusted for proper belt tension. Fan is supported by steel tubing welded on a heavy square steel plate. The manufacturer also offers a low cost suction chamber and ceiling grill assembly that can be used where a complete system is desired.

Distribution Transformer

Allis-Chalmers Mfg. Company has just announced a new distribution transformer embodying new features of design and construction. Cadmium plated 3-way terminals increase wiring flexibility over the former two-way terminals by allowing leads to enter the terminal from any one of three directions. Double conductor insulation is used in these new transformers to give added dielectric strength and greater physical separation of turns. Bushings are coordinated and made of finest grade wet process porcelain with extra wall thickness for high mechanical strength. High voltage bushings have curved shanks to prevent internal flashover and are protected by an overhanging pocket.

Here is the Fan they'll Buy in 1940

GENERAL ELECTRIC 10″ SPECIAL

*And Here's the Backing Every G-E Fan Dealer Will Get FREE

1. A full-color "stopper" display designed to catch the eye—and hold it!
2. Smart catalogs full of selling facts!
3. Direct-mail pieces to help build your volume!
4. Convincing ready-made newspaper mats for local use!
5. Powerful National newspaper ads in over 175 key cities—run at the best time to sell fans—in local hot weather!

And a plus you can't ignore—dominant, colorful National magazine advertising which month in and month out helps maintain user acceptance and keep the G-E name constantly in the limelight.

Because . . .

it's styled to the times—and ahead of them . . . it's priced right . . . it's backed by G-E advertising and promotion* . . . the General Electric name spells quality.

THOUSANDS OF DEALERS CAN'T BE WRONG

Literally thousands of dealers have tied in with G-E Fans for 1940. Almost without exception their orders include a generous stock of the G-E 10″ Special. We'll take the dealers' verdict any time.

See your G-E Distributor today for full details on the 10″ Special and other G-E Fans which make up the most complete line of fans in the industry.

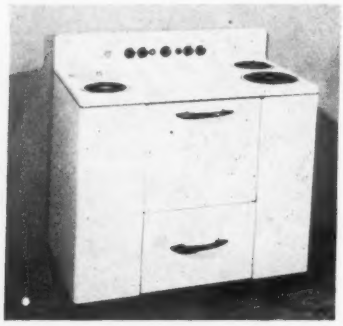
They'll ask for G-E Fans . . . give them what they want

FAN SALES SECTION, APPLIANCE AND MERCHANDISE DEPT., GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONN.

GENERAL ELECTRIC

New Westinghouse Range Models

Two new range models have been added to the Westinghouse 1940 line. One of the new models, the Chieftain illustrated here, is designed to meet the demand for a range fully skirted to the floor in the $100 price class.



This model is a divided top range equipped with three five-speed Corox units, a five-speed Economy Cooker, a balanced heat oven with single dial control, all porcelain finish and black hardware and switch knobs.

The other new model, the Diplomat, is a full-sized range with three storage drawers at a zone 1 price of $129.75.

New Low-Priced Refrigerator

A new low-priced, 6¼ cubic-foot electric refrigerator which will carry a suggested delivered price of $114.75 has been announced by the Nash-Kelvinator Corporation for both its Kelvinator and Leonard lines. At the same time it was announced that the price of the Kelvinator and Leonard models recently introduced at $119.95 had been increased to $125.95 to fit correctly into the company's logical step-up in models.

The new $114.75 model has a high speed, full-sized stainless steel freezer with automatic control, two extra-fast freezing shelves, four fast-freezing trays and a glass chilling tray, a light which automatically turns on when the door is opened, hermetically-sealed, permanently-lubricated unit, and ice capacity of 84 cubes. It has acid-resisting porcelain interior, rustproof shelves, and white enamel exterior finish.

Chelsea Attic Fans

A number of improvements have been announced in the Chelsea 1940 attic fan, Type E, manufactured by Chelsea Fan & Blower Co., New York City. Among the improvements is a new one-piece streamlined venturi orifice which enables the fan to operate far more efficiently and increases the cubic air displacement of any given size without additional horsepower being required.

Fans are equipped with a completely redesigned propeller having four die stamped and formed blades which assure perfect balance, alignment and performance. This type fan is available in seven models ranging in air delivery from 5,000 to 25,000 cubic feet per minute. The fans are listed by Underwriters' Laboratories, Inc., and have certified air deliveries tested in accordance with the standard test code of American Society of Heating and Ventilating Engineers.

Washer with Eye-Appeal

Incorporating design principles planned to increase eye-appeal, the Maytag Company, Newton, Iowa, has introduced a new master washer styled by Harold Van Doren and Associates, industrial designers, in collaboration with company development engineers.

The smooth, one-piece body of the washer is of double-walled type, with one-piece cast-aluminum tub construction. The size of the tub has been increased with a slight change in shape to provide 50 per cent more washing capacity. Motor and all

mechanism is completely encased, although the washer is not skirted to the floor. Other features are a redesigned and improved wringer, individually adjustable legs to change level of the washer, and a hinged lid that opens out to become a table for sorting wet garments.

Unicord for Console Range

A new three-wire all-rubber range Unicord, having an attachment plug with the prongs forming an inverted pyramid, to make the wiring of modern console-type electric ranges easier, has been announced by the General Electric appliance and merchandise department, Bridgeport, Conn. The new addition to the G-E range Unicord line is available with two No. 8 and one No. 10 conductors, or with two No. 6 and one No. 8 conductors. The new cord makes possible convenient connection to ranges having terminal blocks near the floor line and permits the range to be pushed closer against the wall. The plug is rubber and moulded directly to three-wire rubber range cable.

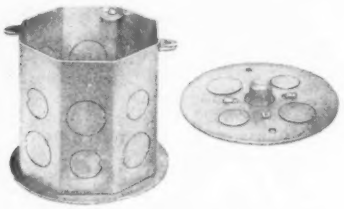
Dilec Electrical Conductors

Dilec Electrical Conductors recently announced to the electrical industry by George C. Richards, licensor's agent, New York City, are made with a new type of fibrous covering composed of a series of cotton yarns laid side by side in contact relation and overlaid by a special rayon binder thread which it is claimed provides complete coverage of the rubber insulation. The new covering results in a wire of smaller overall diameter by reason of the fact that it eliminates all thread crossovers that are necessarily present in braid type coverings.

The new fibrous covering provides a smooth surface that not only gives it improved fishing qualities but also facilitates the printing of identification markings on the surface of the wire.

Outlet Boxes for Concrete

A new line of outlet boxes for installation in concrete has just been announced by the Walker Electrical Company, Atlanta, Ga. The boxes are designed to eliminate all cracks through which concrete might seep and to provide ample clearance for

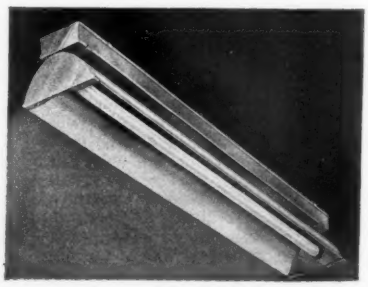


locknuts. These boxes are welded at seams and have knockouts properly positioned. The securely welded cover ears are drilled after assembly to insure correct center to center distance and to insure full threads with no distortion of tapped holes. Another advantage is that nailing lugs are not integral with ear lugs so that there is no possibility of destroying an ear lug if nail lug should be broken.

Wiremold Industrial Units

A new series of single, double and triple industrial type flourescent lighting units for use with all lamp sizes from 18 inches to 48 inches is announced by The Wiremold Company, Hartford, Conn. A special feature of these units is that they may be purchased either unwired or completely wired, ready to hang in position.

Units are furnished with scientifically correct, genuine Alzak or Ox-a-lite reflectors of either concentrating or diffusing type, and adjustable to 2 or 3 angle positions. Finish of the entire unit is attractive durable aluminum.



See your way to new profits via FLUORESCENT light

...Get the story Complete from your Graybar lighting specialist

Right now, buyers everywhere are highly receptive to the idea of lighting modernization using the new fluorescent lamps. Profitable equipment sales and installation contracts are waiting for the man who *knows the whole story* on fluorescents. For sales to stores, offices and industrial plants particularly, you'll need all the facts — all the "do's-and-don'ts," and an up-to-the-minute picture of the reflectors and accessories currently available.

Why waste working time trying to "pick up" the story on fluorescents by piecemeal inquiry from conflicting sources? To see your way clear to fluorescent profits, call on your local GRAYBAR lighting specialist. You'll have a full range of the newest, soundest items to choose from, all backed by the satisfaction-insurance of the GRAYBAR Tag. Or write direct for information, mentioning type of application.

GENERAL ELECTRIC FLUORESCENT LAMPS

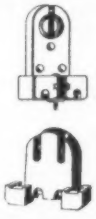
18-inch (15 watts); 24-inch (20 watts); 36-inch (30 watts); 48-inch (40 watts). In white, "daylight," and a wide range of colors for special purposes.

FLUORESCENT REFLECTORS

For Stores, Offices, Industrial Plants including Benjamin *"Streamliter,"* Wheeler *"Vapor-Proof,"* Curtis *"Curtistrip,"* Daybrite *"Commercial"* and other profit-making items.

AUXILIARIES AND SUPPLIES

A full line of approved equipment, including lampholders, starter switches, ballast transformers, and wiring supplies particularly adaptable to modern lighting installations.



"Everything Electrical"

GRAYBAR offers 60,000 items . . . everything electrical . . . the outstanding lines of merchandise and supplies from 200 leading manufacturers. Prompt shipment from 82 warehouses, coast-to-coast.

GraybaR
HEADQUARTERS for FLUORESCENT
LAMPS—ACCESSORIES—REFLECTORS

"With the information I got from GRAYBAR, I was able to get enough fluorescent business to become the 'fluorescent specialist' in this town."

—says Contractor R———— J————

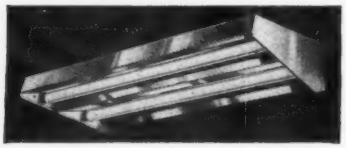
(No. 9 of a series of 10-second "quotes" from typical Graybar customers.)

GraybaR QUALITY SINCE 1869 *Everything Electrical* GraybaR ELECTRIC COMPANY

OFFICES IN 82 PRINCIPAL CITIES
EXECUTIVE OFFICES: GRAYBAR BUILDING, NEW YORK, N. Y.

Fluorescent Window Light

For more attractive show windows of daylight, or natural color, and higher light intensities at same current cost, a new development is offered by Edwin F. Guth Co., of St. Louis, Mo. The Flu-O-Flector is one of the first engineered line of equipment specifically for use with fluorescent lamps in show windows. The new show window Flu-O-Flector per-



forms excellent light coverage for both deep type and shallow type windows; the double-duty feature is made possible by simple but practical "turn-around" reflector feature of the equipment which will produce light results as desired.

The reflectors are made of genuine alzak aluminum to provide maximum light output. Latest high power factor accessories with separate starter switches are included in this new equipment. Made for 18", 24", 36" and 48" lamps and for 2 to 5 lamp rows deep.

New Publications Available to Trade

De-Ion Breaker Panelboards. A five-page illustrated catalog section describing Nofuze "De-ion" circuit breaker panelboards designed particularly for use where the air is filled with chemical or acid vapors and calibrated for use under oil. Write for catalog section 29-460. Dept. 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Leather Belting and Packing. A twenty-four page descriptive booklet or condensed catalog describing "tension welded leather belting." For your copy, write Chicago Belting Co., 113-125 North Green St., Chicago, Ill.

Fluortest Instruments. This four-page folder describes a portable testing device designed for demonstrating and testing of fluorescent lighting installations. For copy of the folder, write Zephyr-Lite Manufacturing Company, 169 North Racine Ave., Chicago, Ill.

Farm Wiring Handbook. This 28-page handbook is offered as a guide for planning electrical wiring on farms. It discusses both plans and installation details. Copies are available from General Electric Co., Bridgeport, Conn.

Bronze Bearings. Over 800 sizes of plain bearings are listed and described together with more than 350 listings of bronze bars in the Johnson Bronze General Catalog No. 400 just issued. Copies may be obtained free by writing the Johnson Bronze Co., New Castle, Pa.

Conduit Fittings. Catalog No. 340 describing Kwikon's wide range of conduit fittings is now available to the trade. Copies may be obtained by writing Kwikon Company, 626 West Jackson Blvd., Chicago, Ill.

Heavy Duty Switches. Trumbull Circular No. 315 has just been issued describing six different types of enclosures for safety switches, motor starters, circuit breakers and service equipment for special applications in various locations where dust or volatile fumes are prevalent. For copies of the circular, write The Trumbull Electric Mfg. Co., Plainville, Conn.

Materials Handling Equipment. More than 175 items of materials handling equipment are described in a new 56-page, Silver Anniversary Edition catalog just issued by Lewis-Shepard Sales Corporation. The catalog is designated as No. 21. Copies may be obtained by writing Lewis-Shepard Sales Corp., 295 Walnut St., Watertown, Mass.

Fluorescent Lamps. A four-page folder giving essential technical data and prices on the complete line of General Electric fluorescent Mazda lamps and auxiliary equipment has just been issued. Copies are available from Incandescent Lamp Department, General Electric Co., Cleveland, Ohio.

Texrope Drives. A new revised catalog section, No. 151, which introduces the new horsepower ratings for multiple V-belt drives recently adopted by the industry, has just been announced. The catalog provides engineering information on selection of size of belt for horsepower rating, speed, center distances and sheave diameters. Copies may be obtained from Allis-Chalmers Mfg. Co., Milwaukee, Wisc.

Industrial Wiring Book. "Adequate Wiring for Industry" is the name of a new General Electric publication. It is a manual of modern wiring methods and materials and includes case histories of several factories demonstrating the benefits realized from modernized wiring. Copies of the 40-page booklet may be obtained by writing General Electric Company, Bridgeport, Conn.

Understanding the Electrical Code

(*Continued from page* 23)

relatively inaccessible. It is necessary, under these conditions, that a second set of overcurrent devices be installed. The second set of devices must then fulfill the following three requirements:

(1) They must be installed as branch circuit overcurrent devices on the load side.

(2) These branch circuit devices must be accessible.

(3) These branch circuit devices must have a lower rating than the service overcurrent device.

These three rules are quite logical in their intent. Their purpose is to have an accessible fuse blow, or an accessible circuit breaker open so that service may be quickly and safely restored. Thus, the service is immediately broken up into branch circuits with smaller fuses insuring proper protection to the smaller branch circuits. At the same time, protection is offered to the unusual but probable condition of short circuits in the heavy feeders from the outer end of the service entrance cables to the branch circuit protection devices.

A special application of the above is allowed for specific circuits feeding loads such as a water heater, range, etc. The overcurrent device feeding only such a circuit may be locked or sealed, provided it is accessible. In most cases a slight delay in replacing fuses or closing a circuit breaker on these circuits will not be too great an inconvenience.

The general rule requires that the service overcurrent device protect all circuits and all equipment. However, five exceptions are recognized.

The first exception allows the service switch to be placed on the supply side of the overcurrent device. This will allow the consumer or service man to replace the fuses while they are "dead."

The discussion in the preceding article of this series applies equally as well to the second exception set forth in section 2375b. This rule allows the potential circuits of meters, control circuits, etc., to be connected ahead of the overcurrent device in addition to the line connection allowed by section 2352 for these circuits on the disconnect.

The next two exceptions provide that if one of the sources for emergency lighting, or for fire alarm or other protective signaling systems, is to be supplied by the main service, then these may be connected ahead of the main service overcurrent protective device. These special circuits, however, must be provided with overcurrent protection.

The introduction of the weatherproof meter and the subsequent installation of this meter ahead of all the service equipment required an exception to the general rule that overcurrent protection be placed ahead of all service equipment. The final exception section 2375e states the conditions under which such an installation may be made. Three rules are outlined for the setting of the meter ahead of the service disconnect and over-

"We believe the 1940 G-E Refrigerators to be the finest products of their kind ever offered to the American public — and will cost less to own than any other refrigerators at any price."

General Electric Company

MODEL PB-6-40

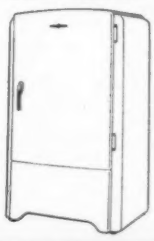
THIS statement is backed by the finest line of G-E Refrigerators ever built—and prices are not only competitive but also protect dealer profits.

When the public can buy known General Electric quality, dependable performance and enduring economy for so little more than the cheapest refrigerators cost—a G-E is the one they will want.

"THEY'LL DO IT AGAIN IN 1940"

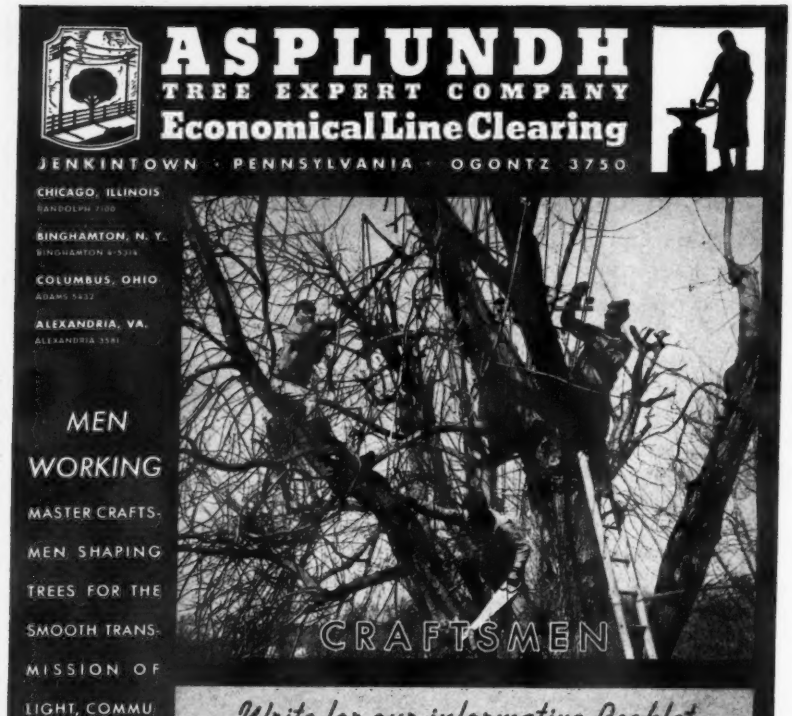
6.2 CU. FT. MODEL LB-6B
with all-steel cabinet, famous G-E sealed-in-steel Thrift Unit, and other features—

$114.75



Prices slightly higher in the south and west.

GENERAL ELECTRIC



current protective device.

First, the supply system must be alternating current; second, the voltage of this supply system must not exceed 300 volts between conductors; and third, the wiring between the meter and service equipment must be (1) installed as separate conductors, or (2) approved service entrance cable, or (3) installed in rigid conduit, or (4) installed in electrical metallic tubing if the circuit does not exceed 600 volts.

Selling Electric Water Heaters

(*Continued from page 13*)

I point out that it is more convenient than the electric refrigerator or range because you have no loading or unloading to do—you only turn the faucet and immediately your quiet, forgotten hot water heater sends you hot water.

It renders a remarkable, useful service for so little cost and no trouble! It is self-starting, self-stopping, needs no regulating, no adjusting; it is as modern as an electric light; it is cool and gives off less heat than a hundred watt lamp; it is clean because there is no flame or by-products of combustion; it is as dependable as night and day due to the absence of any so called moving parts; the unit is immersed in water and operates at about one tenth the temperature of an electric range and therefore, there is no estimating the life of the heater.

Next, I try to get the prospect to visualize the heater in his kitchen or basement, trying to reach the point where the prospect thinks of the electric heater as his own. Often the prospect requests that we go into the kitchen or basement to measure and discuss where he would put it, if he bought. If he doesn't, I pull out the measuring tape and ask where they want the heater. Once I get to measuring, I know the battle has been half won because I am now in the position to see his set-up and heating equipment.

It is indeed the unusual prospect who will tell you the strict truth about his water heating system. Usually when you are face to face with his water heating equipment, the prospect will start admitting its deficiencies, such as old tank, heater in bad condition, leaks, no pressure relief valve, or coil heater flue interfers with furnace draft, causing smoking. Perhaps he complains of knocking pipes, half closed with rust.

Now I point out how a furnace coil uses about 20% of the total coal for house heating. If my figures do not prove this to him, I give a demonstration of the paper clip in a candle flame under a white piece of paper, showing how the cold pipe would interfere with the combustion of gases and could be compared with a steam pipe through his refrigerator. In several cases where the prospect claimed an unusually low operating cost, I have suggested that he weigh his coal for one week. Often the figure is surprising to him.

However, I stress that an automatic hot water service cannot be compared to his system because he is not getting automatic service and that it is truly impossible to get continuous hot water from his system. Also, I impress upon the prospect, that the electric water heater is the one and only electric appliance that is appreciated by every member of the family. If my prospect says "I can't afford it" this indicates to me that I have not given a thorough presentation and have not created the desire, and want, to a sufficient degree.

I always try to word my questions so that I will get a positive answer—yes—and try to avoid a negative question that requires the answer, no. I have noticed that the more a person says 'No' the angrier he gets; whereas, the more he agrees with me in answering 'Yes', the more agreeable he becomes. It is possible to put a ring of 'yesses' around the prospect so that he answers himself right into the sale!

I also use my testimonials and show many users in his neighborhood. I am serious and in earnest at the close, because no one ever spends a hundred dollars in a joking manner. I usually have the contract already made out and present it to the prospect telling him to "sign here," thus I let him know that I expect the order. Many times I do not have to ask for the order merely giving him a leading question before, such as "Wouldn't it look good in your kitchen?" "May we install the heater tomorrow?" There are many good leading questions.

If I do not close the sale at the

appointment, I try to leave the door open by telling him I'll get up some special information that would apply only to his particular case, or make a showroom appointment. I remember though that over ninety per cent of my sales have been sight unseen bought in the home. So I make notes of special interest to the prospect so that I may again get in his front door on recalls.

Selling the Contest To the Salesman

(*Continued from page 15*)

exactly right. Slang and terminology of the contest should be used liberally: if the contest theme is baseball, make plenty of references to "Smith died on third base last week," "Jones went down swinging without a hit, but he's warming up for his next shot at bat," "Brown was on the bench last week with a cold, but he'll be in the line-up next week." Give the men nicknames: "Slugger Smith," "Racehorse Williams," "Beanball Brown." Don't hesitate to kid them, to capitalize on amusing incidents of business. If Jones comes in with a bang-over one morning, and the office is kidding him about it, take a crack at him in the house-organ: "Jones was training on beer last week, while Smith, the clear-water kid ran away with the honors." When the men begin kidding each other because of what the house-organ says you can know its a success.

These factors the selection of a contest and basis for competition, plus the ever-essential scoreboard and house-organ, comprise the starting equipment for a first rate contest. The elements of prize awards and contest routine will be drawn out in later discussions of different types of contests.

Saleswomen Used For Canvassing

(*Continued from page 17*)

tions to be answered by the customer, questions which he says every individual answers even in buying a cold drink. These five buying decisions are (1) need, (2) brand, (3) source, (4) price, and (5) time. "If a sales person can get a favorable answer to these questions," said Mr. Allen, "the sale is in the bag!"

Like many other appliance dealers, this appliance department sells electric refrigerators on the meter plan, but it is said to be the only appliance store which sells electric ranges on the meter plan. This plan, adopted by Mr. Allen, has been a tremendous aid in advertising the ranges and has contributed considerably to the great increase in volume experienced in the last few months. In passing on the credit of prospects purchasing ranges on the meter plan, Mr. Allen said, the firm is about as strict as on the older club plan sale. This must be so, he explained, because of the fact that it would be too easy for the wrong kind of people, under the meter plan, to regard the daily payment as rent rather than as a definite purchasing obligation.

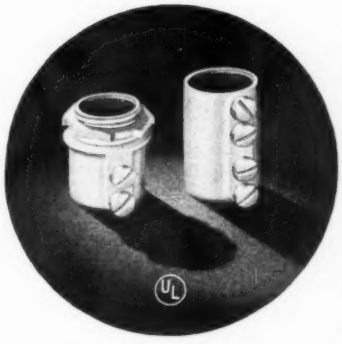
Other contributing factors toward the increased volume have been generous advertising by newspapers and radio programs, the stocking of complete and dependable lines, and the determined effort to keep customers satisfied after sales have been closed and appliances installed. Follow-up letters and calls play an important part in holding down returns and repossessions.

NEW LOW PRICES!

for

Set Screw "E. M. T." Fittings

Effective Now



"E.M.T." CONNECTORS			
No.	Size	Std. Pkg.	Cost per 100
402	½"	250	$ 5.00
403	¾"	125	7.00
404	1"	100	12.00
"E.M.T." COUPLINGS			
452	½"	250	$ 5.00
453	¾"	125	7.00
454	1"	100	12.00

New, greater economy! Now you can save fully 20% on first cost alone! And with this saving, an easier, speedier, more secure and more rigid installation.

Approved by Underwriters' Laboratories, Inc.

KWIKON CO. 626 W. JACKSON CHICAGO, ILLINOIS

Bank Lighting With Fluorescents

(*Continued from page 21*)

In some applications of fluorescent lighting to tellers cages, objection had been raised to the flicker, or stroboscopic effect, of the lamps. As the "tulamp" auxiliary had not been announced at the time that this equipment was ordered, the stroboscopic effect was eliminated by connecting adjacent coffers to alternate phases of the 4-wire, 3-phase distribution system. This expedient has been most successful

Although the daylight lamp seems to be the most popular in most cases, the white lamp was selected in this instance as it makes possible a 20% increase in the illumination and gives a color quality more in keeping with this type of business. After the lamps had been allowed to burn long enough to reach their stable light output, light meter readings showed an illumination level of 75 foot-candles over the entire banking area. Sufficient light is reflected from the floor and fix-

tures to light the bottom of the beams and overcome objectionable contrasts in the ceiling brightness.

On entering the bank, one receives the impression that the room is lighted by a series of skylights. This job has easily received more attention and favorable comment from the public than has any other lighting installation in this territory. The lighting equipment was installed by the Starr Electric Company of the same city.

Service Opportunities In Locker Plants

(*Continued from page* 31)

least two or more compressors in order to reduce the great amount of risk involved from the loss of perishable meat in the event a compressor failed. Also, in addition to the compressors for the locker room, in most cases, an individual compressor will be used in the freezer and chill rooms.

Let us consider the operation of a typical locker storage plant. The operator of the plant derives the greatest part of his income from the rent of the lockers, but a good many of the operators use their employees to provide further service. These men are available to the farmer for killing and dressing animals at a small charge. The animals are carried into the plant, where an expert butcher properly cuts and wraps each individual piece in a good grade of parchment paper to eliminate dehydration of the meat as much as possible. There is another small charge for this processing.

The farmers may pay cash for the services mentioned or the equivalent in meat may be acceptable to the operator, who selis it to the retail trade from another piece of refrigerated equipment such as a display case.

The storage lockers are all located in one large room with narrow aisles to conserve as much space as possible, yet with two or three feet left between the top of them and the ceiling to provide good circulation. The lockers range in size from 5 to 8 cubic feet each and are arranged three tiers high with the largest lockers on the bottom. The temperature in this room ranges from 5 to 10 degrees above zero, Farenheit. Pipe coils and coils with wide spaced fins suspended from the ceiling and walls of the room have been used frequently for refrigerating the storage rooms, as well as forced draft units evenly spaced throughout the room.

Adjoining the locker room is a chiller or precooling room operated at about 34 degrees, F., where a good portion of the animal heat load is removed before and while it is being cut and wrapped. Inside of the chiller room is located a fast freezing room which may be a small room or a fast freezing cabinet with drawers in it. It operates at a temperature of about 10 degrees below zero, F., and is used to "quick freeze" the meat which eliminates the bursting of the meat cells and gives it a better flavor when used. After it is frozen it is then ready to be placed in the lockers with no heat load to be removed.

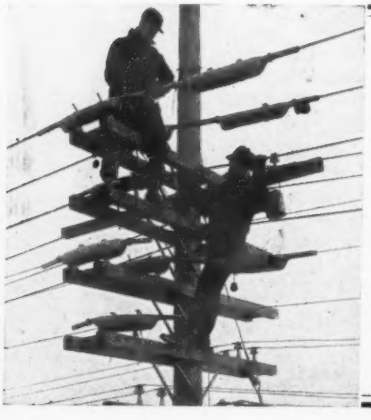
Frosting of the coils is a problem throughout the locker plant, and the freezer room possibly would give most trouble, but in some cases a forced draft coil is used and is arranged so that by closing two doors it can be isolated from the refrigerated compartment and a water hose used to melt off the ice, so that the doors may be opened again and the coil immediately put back into use. (See March issue, page 36).

Although the locker plant was first developed for the preservation of meat, it has been found to offer many more advantages to its customers. They may have game or domesticated meat in the summer that was actually killed in the winter; or enjoy fresh vegetables in the winter that were gathered in the summer, preserved with all their freshness and flavor at a cost that anyone can afford to pay. Certainly these plants will prove a boon to the rural folk; and to the service engineers they'll become a whole new field of opportunity.

Connecting Diagrams for Lap-Wound A-c Motors

(*Continued from page 32*)

When it is desired to place the stub and pole phase group connections below the winding and to keep the space between the coil ends and end bell clear, then the third or fourth method of bringing



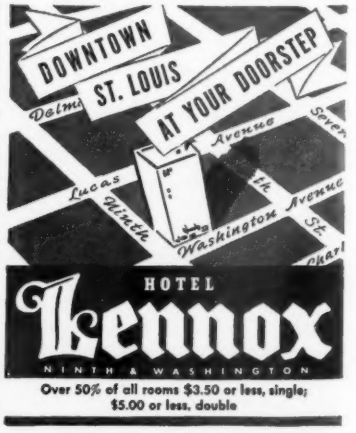
MARSHALL'S
ONE-PIECE
LINEMEN'S SHIELDS
PROTECT THOROUGHLY

These famous shields not only meet all safety codes, but are built to give more *thorough* protection. They may be used on single or double cross-arm jobs. They cover wire and two insulators completely, stand up under long hard usage and are more easily and quickly handled due to one-piece construction.

Over 1,000 utilities now standardize on MARSHALL'S SHIELDS. May we send prices and full information? Drop us a card today.

LINEMEN PROTECTOR COMPANY
1744 W. Alexandrine Detroit, Mich.

"I'm at hotel Mayfair"
CENTER OF ST. LOUIS BUSINESS
"Fine, that's near my office"
Over 50% of all rooms $3.50 or less, single; $5.00 or less, double


DOWNTOWN ST. LOUIS AT YOUR DOORSTEP
HOTEL Kennox
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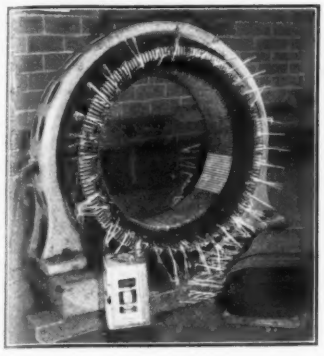

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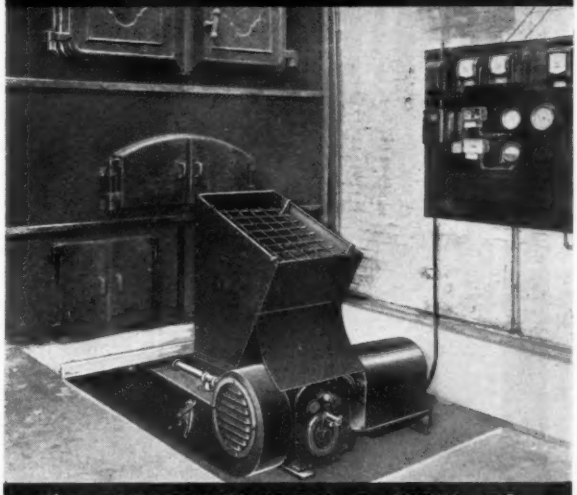

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out leads is used, with the leads bent down as explained in this article and in Figs. I and J.

The four methods described in these two articles are based on pulling the coils with the coil leads on the bottom. This has some advantage in connecting and winding the stator, but it is somewhat awkward to bend the starting lead while the coil is still in the pulling machine. For this reason, some rewinders prefer to pull the coils with the leads on the top.

When the coils are pulled with the leads on the top, it means that the lead location on the stator winding is the reverse of that shown in the diagrams in these two articles, as the finishing lead would be brought out from the bottom of the bottom coil half, and the starting lead would then be brought out from the bottom of the top coil half as shown in Fig. L. It will be noted that the starting lead has now become the top lead and is brought out across the left hand side of the diamond point of the coil, whereas with the leads on top method, the starting lead is the bottom lead and is brought out on the right hand side of the diamond point.

With the leads on bottom, as in Fig. L, the leads are further away from the air gap. However, when it is desired to bend the leads down as in Figs. I and J, the leads on top method is the best as a comparison of Figs. J and L will indicate.

The next article will present the two-parallel, eight-pole connecting diagrams. These will be arranged for magnetic balance so that equalizer connections can be used. In addition, we will discuss the methods used in making stub, and pole phase group connections.

Industry Adopts Transformer Standards

(Continued from page 37)

as pole-type regulators, the availability of which is increasing, provide a means of effecting voltage regulation, out-dating the use of taps to overcome low voltage with resulting excessive voltage at light loads. Fixed boost transformers at junctions often can be used to raise voltage in lieu of taps in individual transformers, with improved convenience and economy. Furthermore, taps in transformers reduce ruggedness, especially in ability to withstand lightning surges.

A careful survey of users' requirements showed a strong preponderance of opinion in favor of standardizing on transformers without taps for ratings 2,400, 4,800 and 7,620-v high voltage, 120/240 low voltage. In the 7,200-v 120/240 rating usage was more evenly divided but the large group which considered taps unnecessary in this voltage class determined the adoption of the more economical non-tapped units as basic standards in the most widely used ratings 1½ to 7½ kva inclusive.

Voltage Ratios. The Joint Committee accepted with minor exceptions as a basis of transformer voltage ratios, the "Preferred Voltage Ratings for A-C Systems and Equipment" adopted in 1930 by the National Electrical Manufacturers Association and National Electric Light Association.* However, it was keenly mindful of some

* N.E.L.A., Publication No. 048; NEMA, Publication No. 100, April, 1930.

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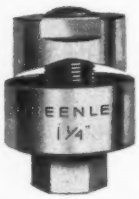

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divergence of experience as to suitability of the industry "Preferred Voltage Ratings" of distribution transformer ratios, especially in the 7,200, 7,620, 12,000 and 13,200-v groups. Nevertheless it adhered to these present values, pending findings of an E.E.I.-NEMA Joint Committee now engaged in reviewing these "Preferred Voltage" schedules.

Bushings. Bushings in transformers, as to numbers, types and locations, was another feature where practices were diversified and unification desirable. These comprise stud versus lead as to type; cover, sidewall and pocket as to location; and one versus two as to number.

From further survey of needs and preferences of users, the Joint Committee determined that early complete standardization would be impracticable. However, the stud type was approved as preferable to the lead type bushing. The Joint Committee urges that experience and trends be carefully observed, with a view to bringing about further unification of practice as rapidly as practicable.

The matter of uniformity of external connections to bushing terminals was studied with a view to providing for maximum practicable interchangeability. In working this out, determining weight was given to location of low voltage terminals in view of the much heavier low voltage conductors requiring to be manipulated.

Insulation. The Joint Committee accepted as a basis of transformer insulation strength requirements the Proposed American Standards for Transformers, Regulators, and Reactors, Etc., C57.1, .2 and .3 It is cognizant, however, of present active work of the E.E.I.-NEMA Joint Committee on Insulation Coordination and expects to utilize its findings as made available.

Electrical Performance Characteristics. The Joint Committee is carefully reviewing practices and trends of electrical performance characteristics for transformers with the objective of determining values which will prove adequate and economical for prevailing needs.

Standards Prepared

Standards prepared by the Joint Committee, as technical specifications, are attached hereto and form part of this report. The more essential mechanical features of these standards are illustrated in outline sketch, page 2. (*Copies of the complete "First Report" and standards referred to here are available at nominal cost from Edison Electric Institute, or National Electrical Manufacturers' Assn.*)

Standards in this First Report cover only a portion of distribution transformer ratings. The Joint Committee has planned and is continuing its work with the objective of extending these standards in subsequent reports, to embrace the entire range of overhead distribution transformer ratings.

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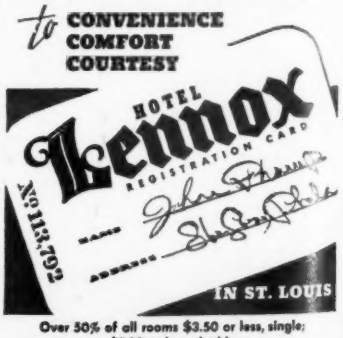

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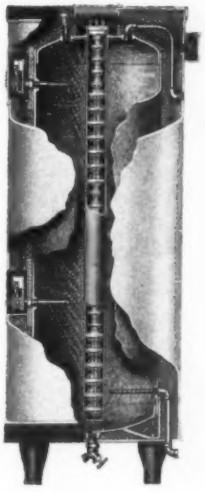

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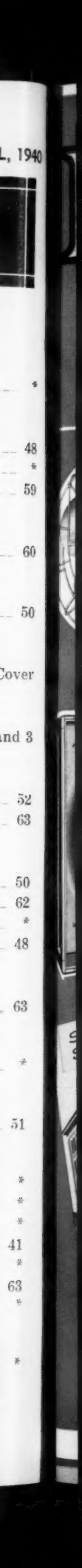
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